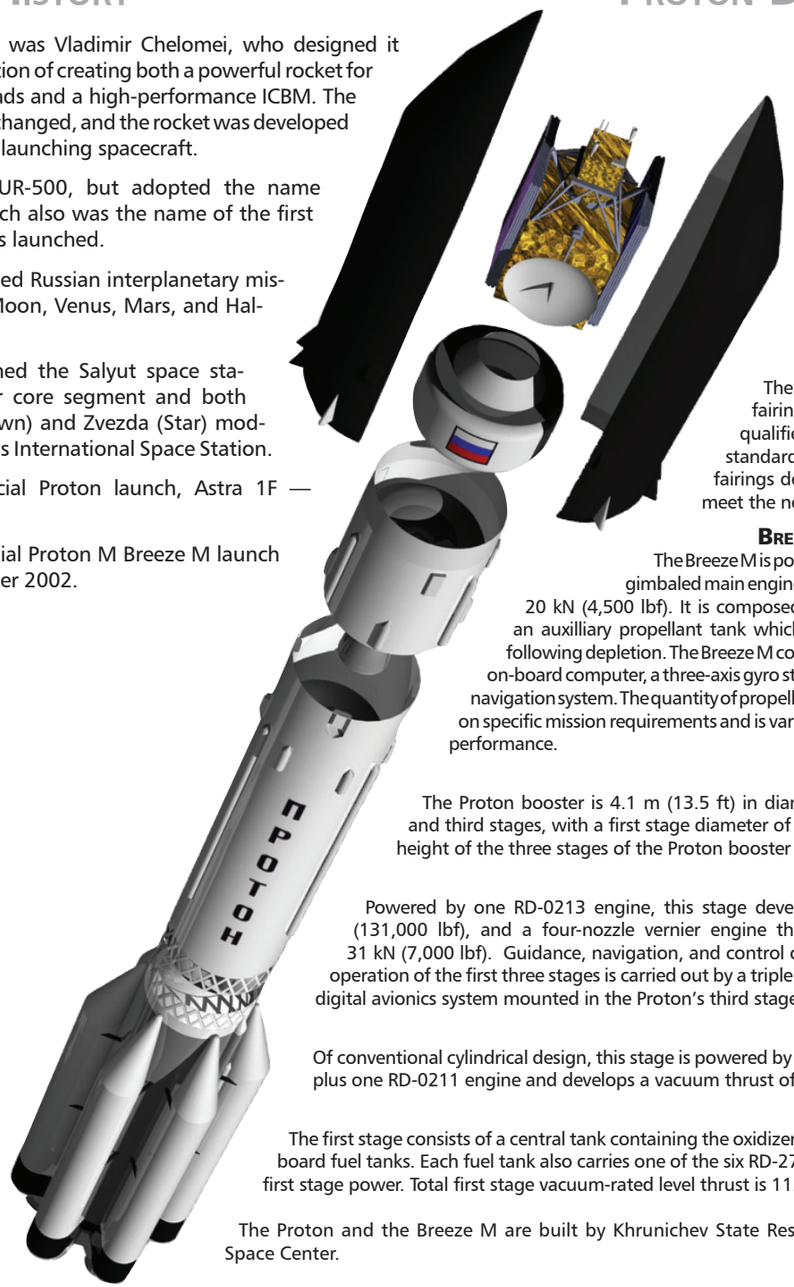
THE VEHICLE

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch, Astra 1F — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002.



Proton Description

Total Height
58.2 m (191 ft)

Gross Lift-off Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

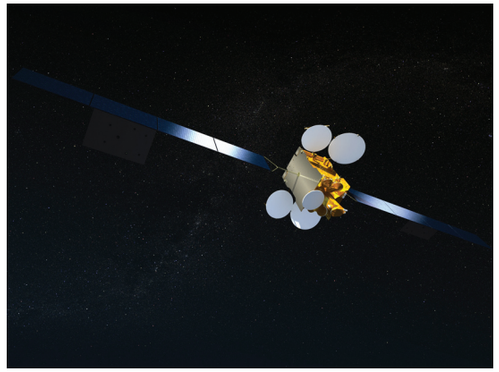
Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE SATELLITE



Satellite Operator
SES
www.ses.com

Satellite Manufacturer
Astrium
www.astrium.eads.net

Platform
Eurostar E3000

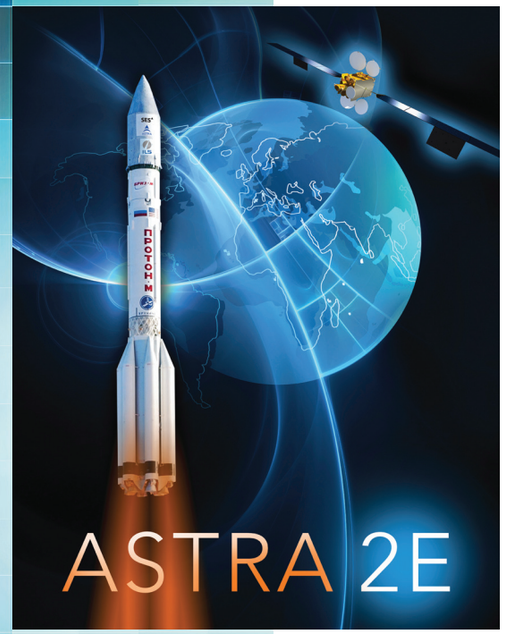
Separated Mass
6020 kg

Satellite Mission Lifetime
15 Years

Satellite Mission
ASTRA 2E will carry Ku- and Ka-band payloads for the delivery of high-performance Direct-to-Home (DTH) and next generation broadband services in Europe, Middle East and Africa. Built by Astrium, Astra 2E will bring replacement and growth capacity at 28.2° East to enhance SES' fleet of over 50 geostationary satellites, and ensure reliable and secure connectivity to over 99% of the world's population.

SES
your satellite company

ASTRIUM
AN EADS COMPANY



Mission Overview

ILS

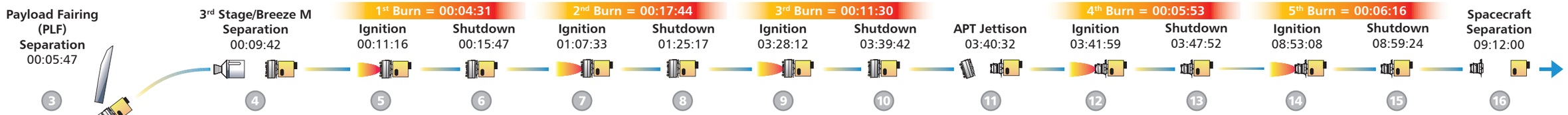
Experience ILS: Achieve Your Mission
QUALITY | PERFORMANCE | EXPERIENCE | DEDICATION

www.ilslaunch.com

Astra 2E

- **5th** ILS Proton Launch in 2013
- **82nd** ILS Proton Launch Overall
- **23rd** SES Satellite Launched on Proton
- **17th** Astrium Satellite Launched on Proton

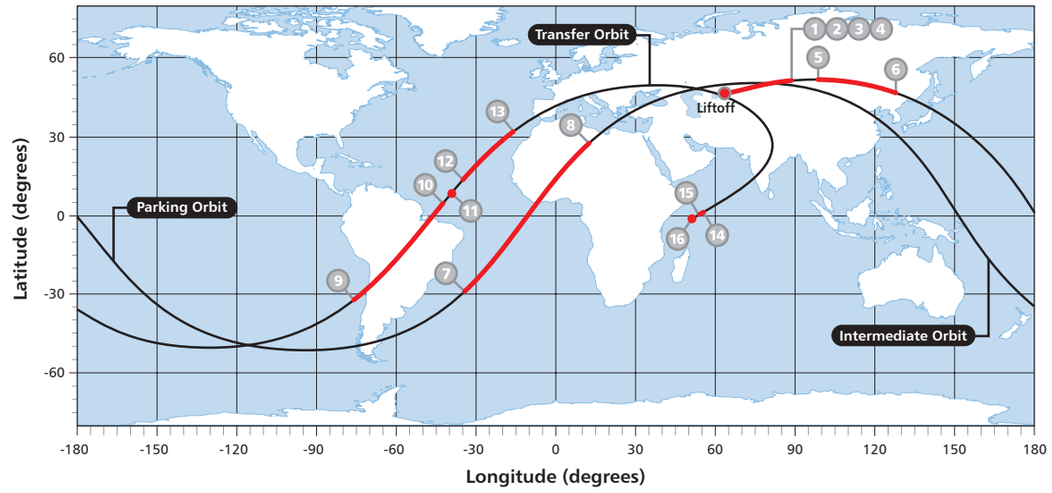
THE **MISSION**

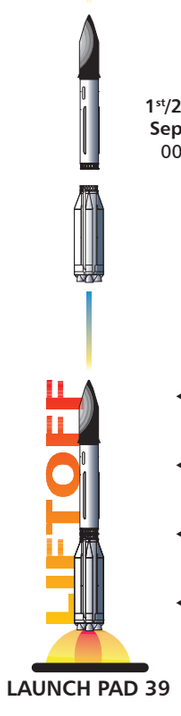


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the Astra 2E satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the Astra 2E satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geosynchronous transfer orbit. Separation of the Astra 2E satellite is scheduled to occur approximately 9 hours, 12 minutes after liftoff.

GROUND TRACK

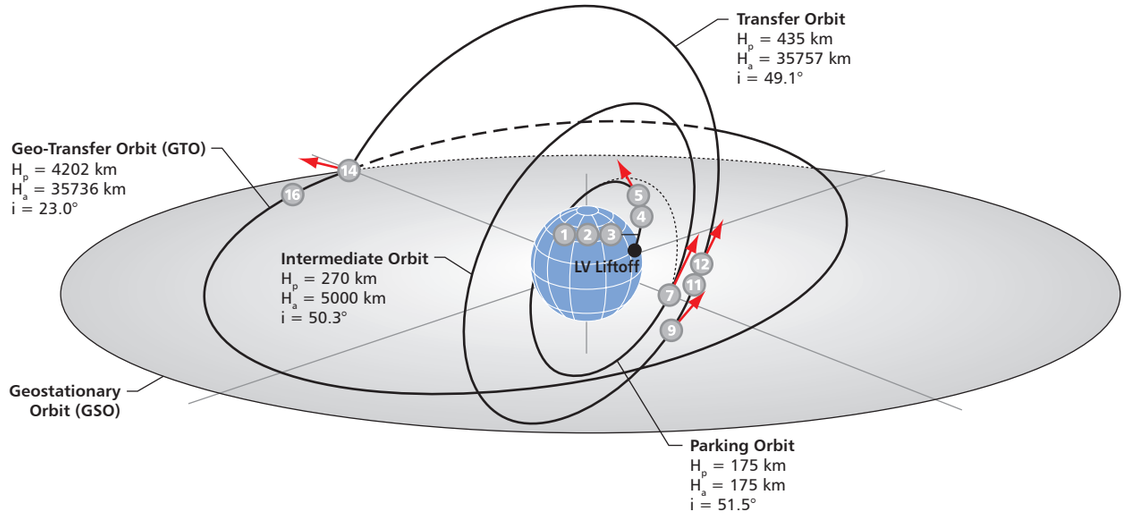




- **Maximum Dynamic Pressure** 00:01:02
- **Command Stage 1** (100% Thrust) -00:00:00.9
- **Stage 1 Ignition** (40% Thrust) -00:00:01.75
- **Ignition Start Sequence** -00:00:02.5

ASCENT PROFILE

PROTON ON PAD 39



FLIGHT DESIGN

Proton

TOTAL HEIGHT
58.2 m (191 ft)

GROSS LIFT-OFF WEIGHT
705,000 kg
(1,554,000 lb)

PROPELLANT
UDMH and NTO

INITIAL LAUNCH
16 July 1965
Proton-1 Spacecraft

PAYLOAD FAIRINGS

There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

BREEZE M UPPER STAGE

The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxiliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

PROTON BOOSTER

The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

Satellite

SATELLITE OPERATOR
SES
www.ses.com

SATELLITE MANUFACTURER
Airbus Defence and Space
www.airbusdefenceandspace.com

PLATFORM
Eurostar E3000

SEPARATED MASS
6,002 ±20 kg

SATELLITE MISSION LIFETIME
15 Years

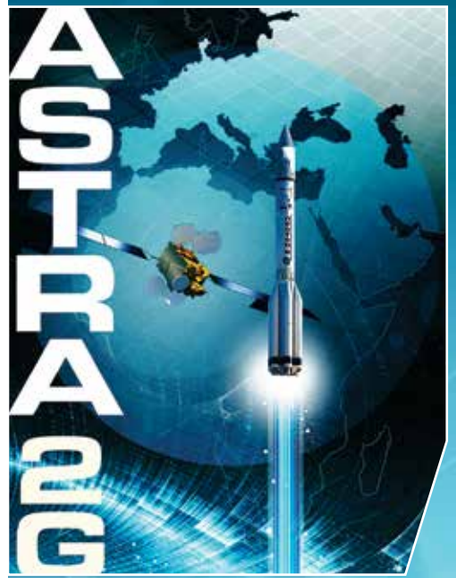
SATMED, an e-health platform conceived by SES and supported by the Luxembourg Government and the Ministry for Cooperation and Humanitarian Action is a satellite based communication solution aimed to improve public health in emerging and developing countries.

SATELLITE MISSION

ASTRA 2G is the third spacecraft of a three satellite investment programme (ASTRA 2E, 2F and 2G) that SES contracted with Airbus Defence and Space in order to provide replacement as well as incremental satellite capacity in the orbital arc of 28.2/28.5 degrees East. ASTRA 2G carries 62 Ku-band transponders as well as 4 Ka-band transponders. The different beams provide coverage over the UK and Ireland, Europe and West Africa.

Information contained herein is subject to change.

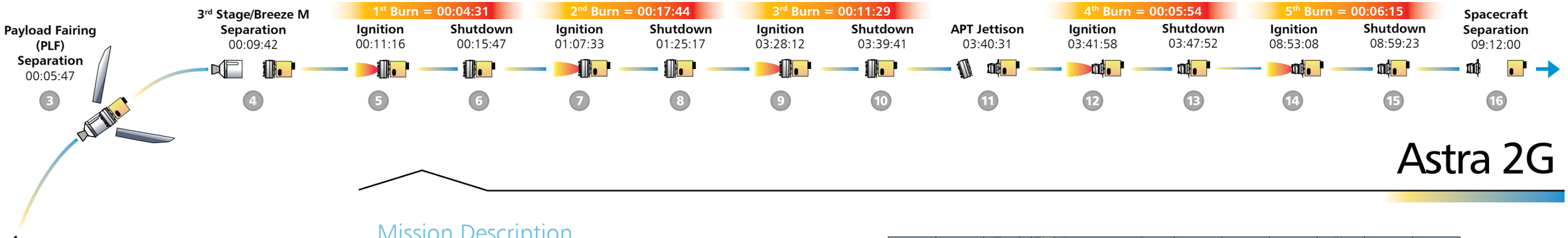
Mission Overview



- **2nd** ILS Proton Launch in 2014
- **86th** ILS Proton Launch Overall
- **24th** SES Satellite Launched on ILS Proton
- **18th** Airbus DS Satellite Launched on ILS Proton

Astra 2G

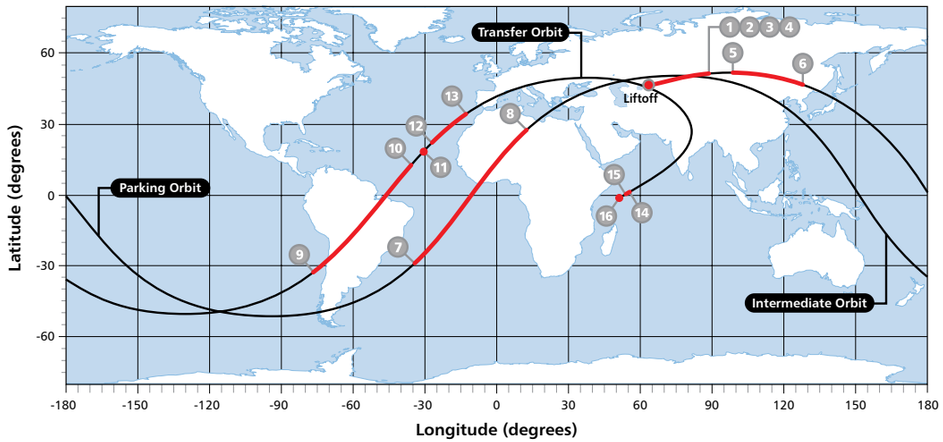
www.ilslaunch.com



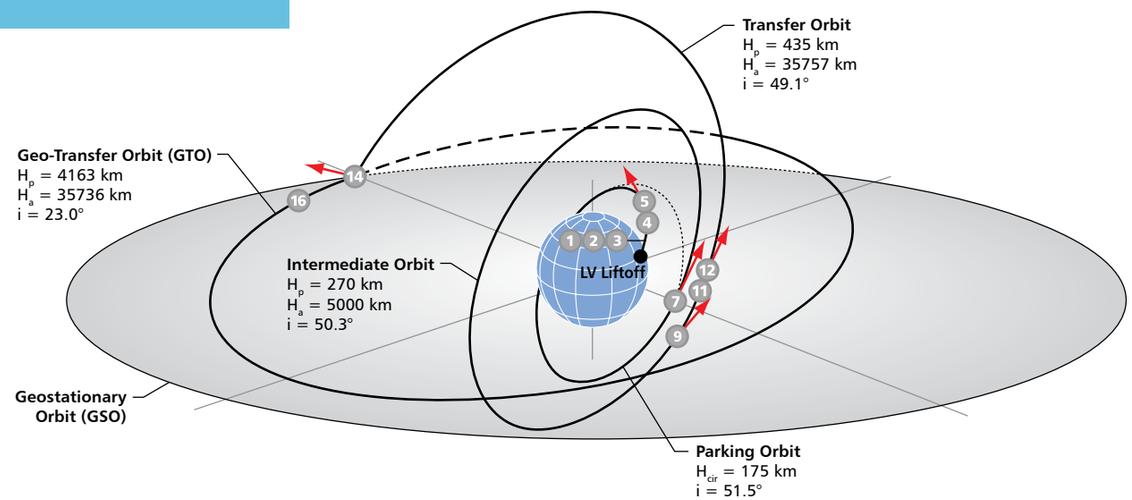
Astra 2G

Mission Description

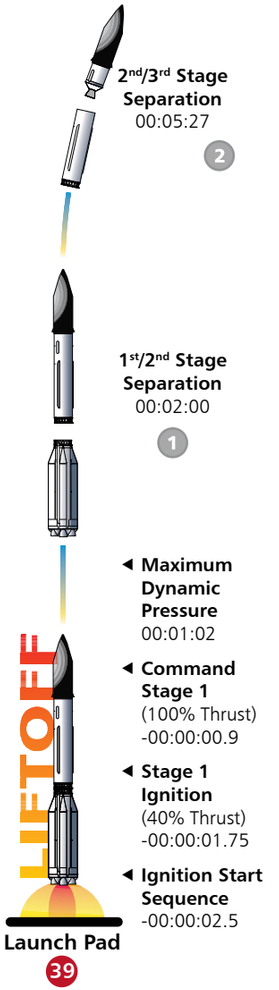
The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at the Baikonur Cosmodrome in Kazakhstan, with the Astra 2G satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the Astra 2G satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geosynchronous transfer orbit. Separation of the Astra 2G satellite is scheduled to occur approximately 09 hours, 12 minutes after liftoff.



Ground Track



Flight Design



Ascent Profile

Launch Pad
39

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name “Proton,” which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley’s Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today’s International Space Station.
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002

THE VEHICLE

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
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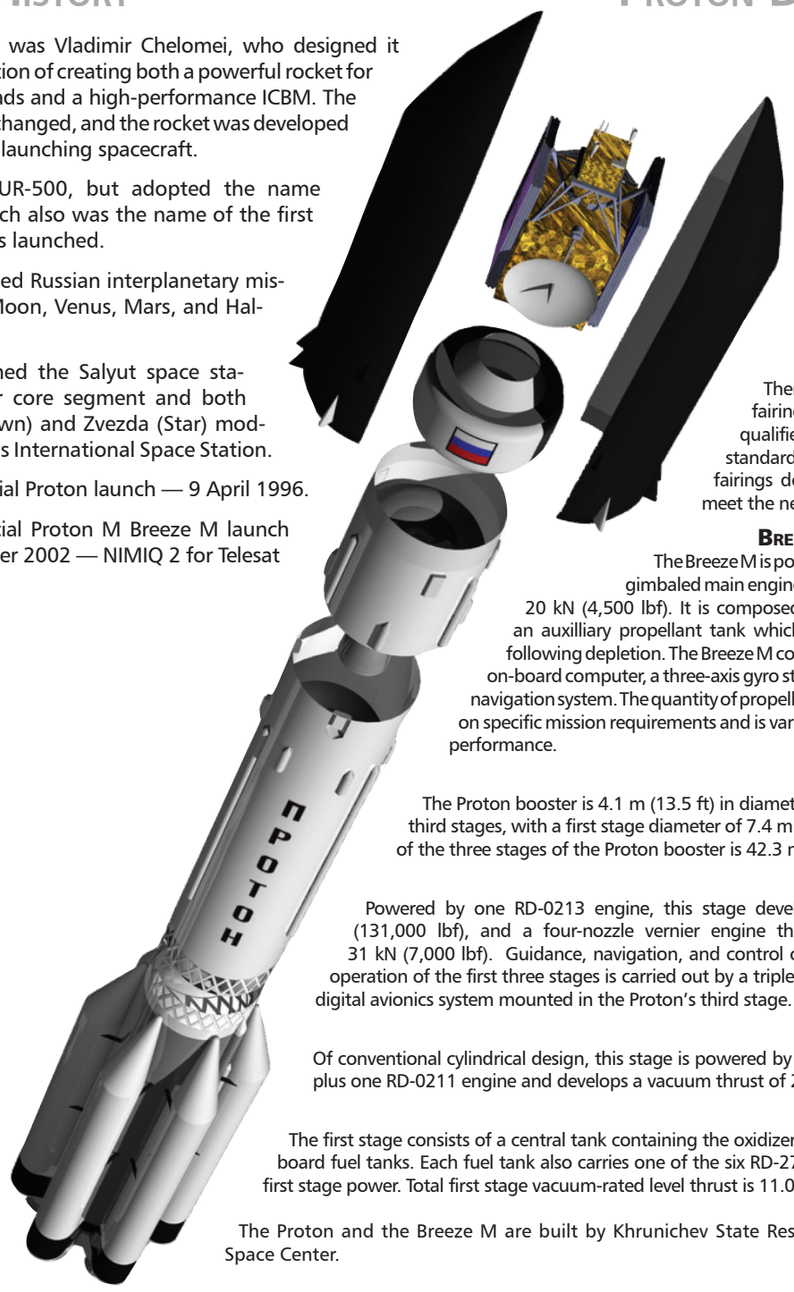
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002 — NIMIQ 2 for Telesat



Proton Description

Total Height
56.2 m (184 ft)

Gross Lift-off Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE SATELLITE

Satellite Operator
Telesat
www.telesat.com

Satellite Manufacturer
Space Systems/Loral
www.ssloral.com

Platform
SS/L 1300

Separated Mass
4905 kg

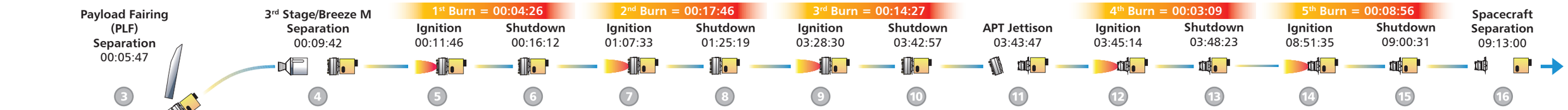
Satellite Mission Lifetime
15 Years

Satellite Mission
Anik G1 is a commercial communications satellite built by Space Systems/Loral for Telesat. The multi-mission, 55 transponder satellite will be located at 107.3° West longitude. This satellite will double C- and Ku-band capacity over South America from this orbital location, provide additional DTH services in extended Ku Band and provide military X-band coverage of the Americas and substantial portions of the Pacific Ocean.

Anik G1

- **9th** Telesat Satellite Launched on ILS Proton
- **26th** Space Systems/Loral Satellite Launched on ILS Proton
- **79th** ILS Proton Launch Overall
- **2nd** ILS Proton Launch in 2013

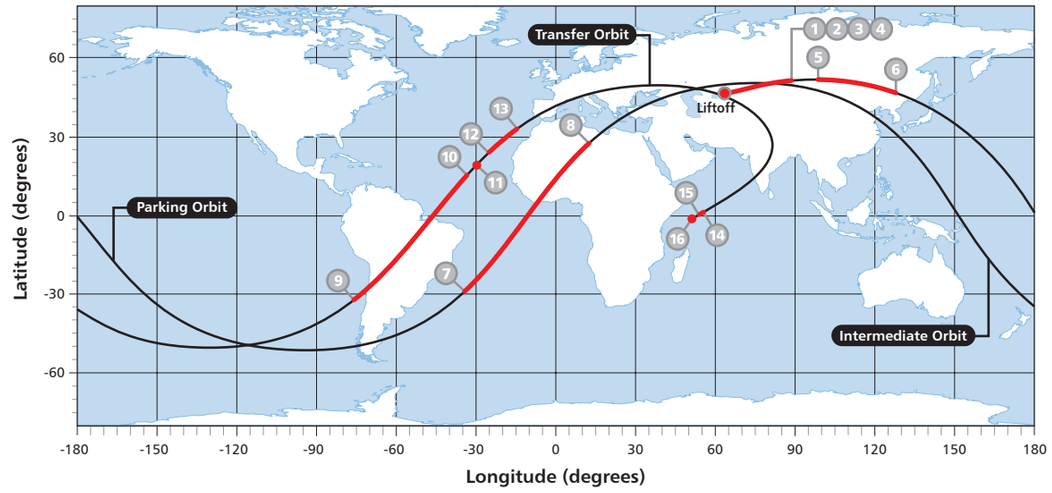
THE **MISSION**

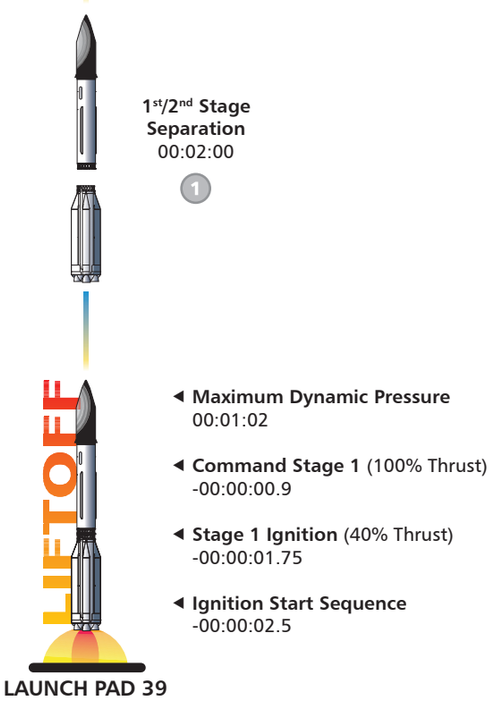


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the Anik G1 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the Anik G1 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geostationary transfer orbit. Separation of the Anik G1 satellite is scheduled to occur approximately 9 hours, 13 minutes after liftoff.

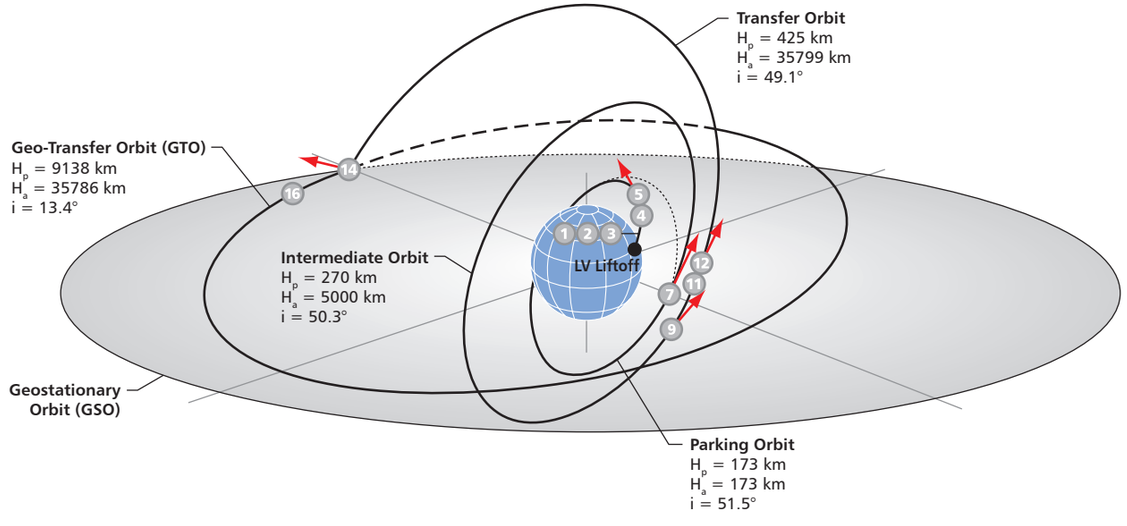
GROUND TRACK





ASCENT PROFILE

PROTON ON PAD 39



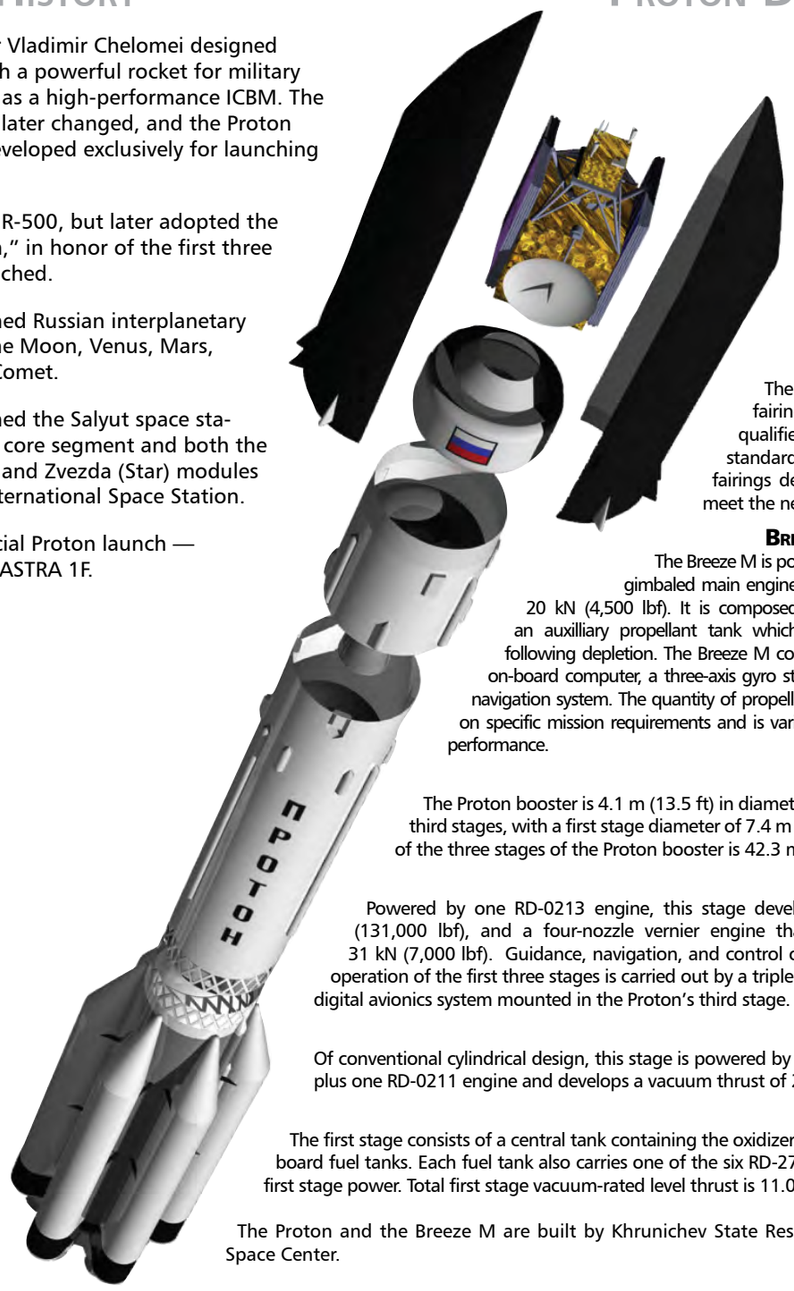
FLIGHT DESIGN

THE VEHICLE

Proton History

- Lead designer Vladimir Chelomei designed Proton as both a powerful rocket for military payloads and as a high-performance ICBM. The program was later changed, and the Proton rocket was developed exclusively for launching spacecraft.
- First named UR-500, but later adopted the name "Proton," in honor of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996, ASTRA 1F.

Proton Description



Total Height
56.2 m (185 ft)

Gross Liftoff Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and N_2O_4

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE SATELLITE

Satellite Operator
Asia Satellite Telecommunications Co. Ltd. (AsiaSat)
www.asiasat.com

Satellite Manufacturer
Space Systems/Loral
www.ssloral.com

Platform
1300 Spacecraft Bus

Separated Mass
3,760 kg

Satellite Design Life
15 Years

Satellite Mission
AsiaSat 5 is a new generation satellite equipped with the latest technology and new beam coverage to provide highest quality television broadcast, telephone networks and VSAT networks for broadband multimedia services across Asia Pacific. In addition to a very powerful pan-Asian C-band footprint and the improved Ku-band East Asia beam, AsiaSat 5's new Ku-band South Asia and in-orbit steerable beams are designed to serve new market requirements and to offer full backup capability in network coverage with AsiaSat's existing satellites AsiaSat 3S and AsiaSat 4. AsiaSat 5, a replacement satellite for AsiaSat 2, will be located at 100.5 degrees East.

ILS
www.ilslaunch.com

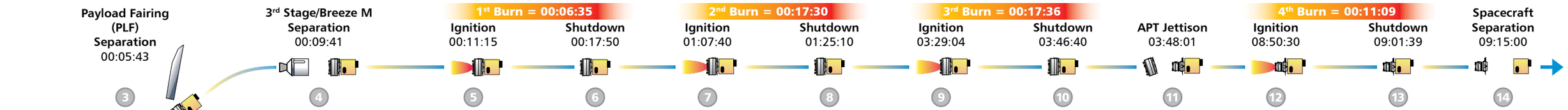
AsiaSat 5

Mission Overview

- **6th** Proton Launch of 2009 / **4th** ILS Proton Launch of 2009
- **53rd** Proton Launch for ILS
- **4th** AsiaSat Satellite Launched by ILS
- **12th** Space Systems/Loral Satellite Launched on Proton

KHRUNICHEV STATE RESEARCH AND PRODUCTION SPACE CENTER

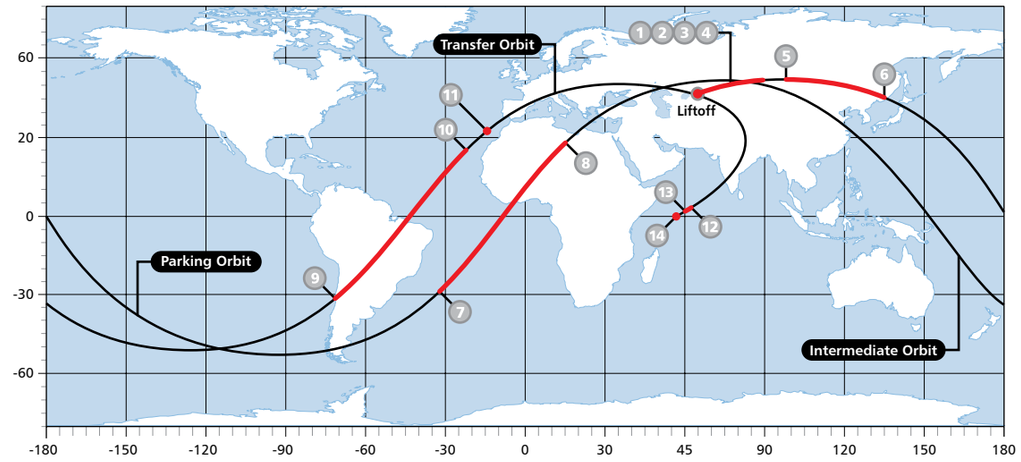
THE **MISSION**

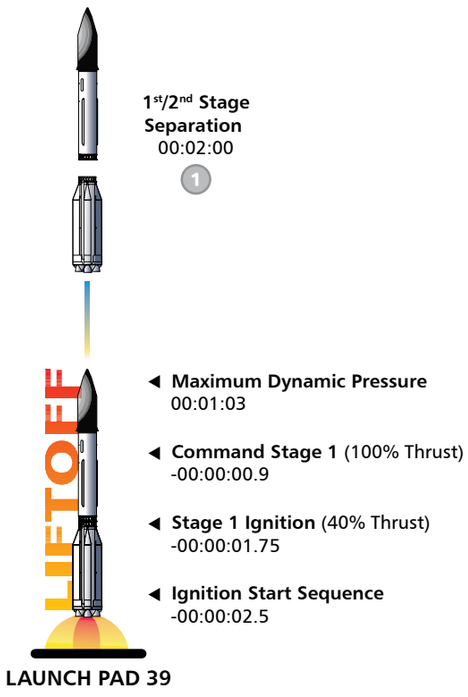


MISSION DESCRIPTION

The Proton launch vehicle, utilizing a 4-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the AsiaSat 5 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the Orbital Unit (Breeze M upper stage and AsiaSat 5) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the Orbital Unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geo-transfer orbit. Separation of the AsiaSat 5 satellite is scheduled to occur approximately 9 hours, 15 minutes after liftoff.

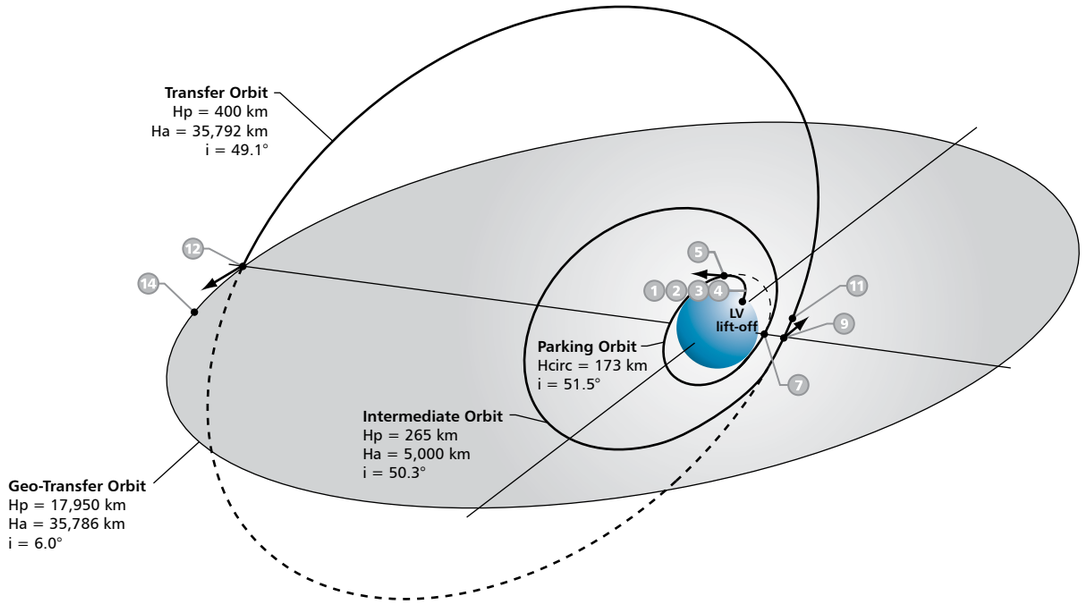
GROUND TRACK





ASCENT PROFILE

PROTON M ON PAD 39

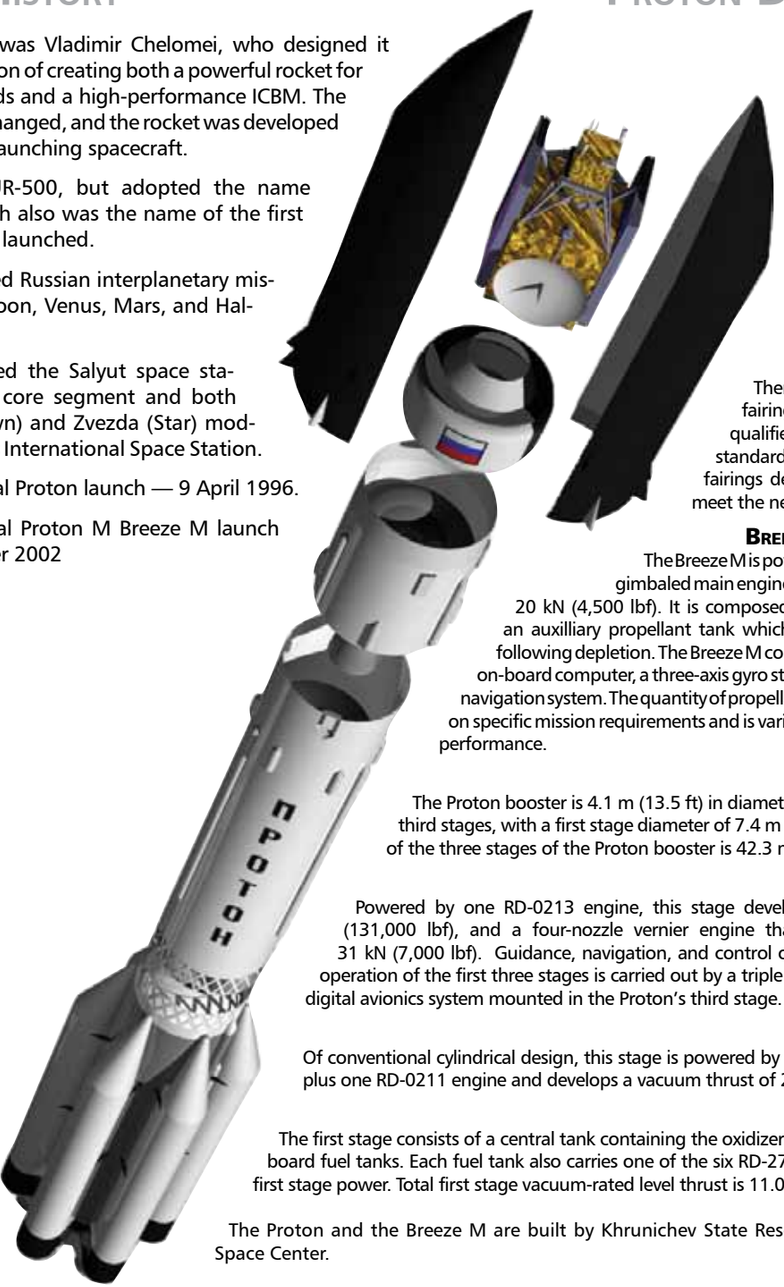


ORBIT INSERTION

THE **VEHICLE**

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002



Proton Description

Total Height
58.2 m (191 ft)

Gross Liftoff Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE **SATELLITE**

Satellite Operator
AsiaSat
www.asiasat.com

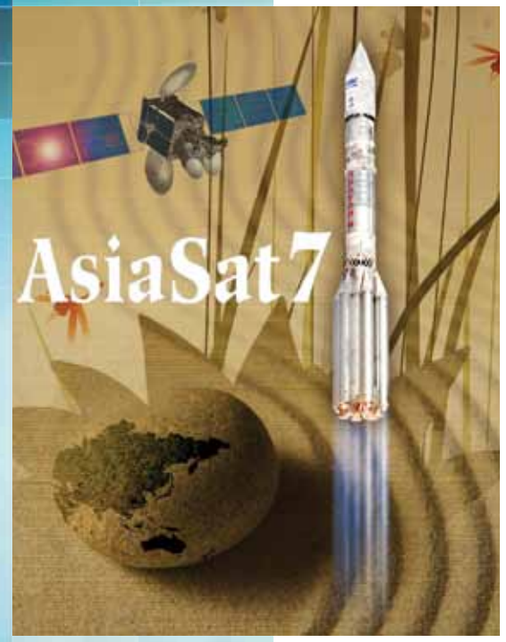
Satellite Manufacturer
Space Systems/Loral
www.ssloral.com

Platform
SS/L 1300

Separated Mass
3,813 kg

Satellite Mission Lifetime
15 Years

Satellite Mission
AsiaSat 7 is designed as a replacement satellite for AsiaSat 3S at 105.5 degrees East. This new generation satellite will carry 28 C-band and 17 Ku-band transponders, and a Ka-band payload. Its region-wide C-band beam covers over 50 countries across Asia, the Middle East, Australasia and Central Asia. AsiaSat 7 also offers 3 Ku-band beams with intra beam switching capability, serving East Asia and South Asia, and a steerable Ku beam to satisfy changing market demand. AsiaSat 7 will provide television broadcast and VSAT network services across the Asia-Pacific region.



Mission Overview

ILS

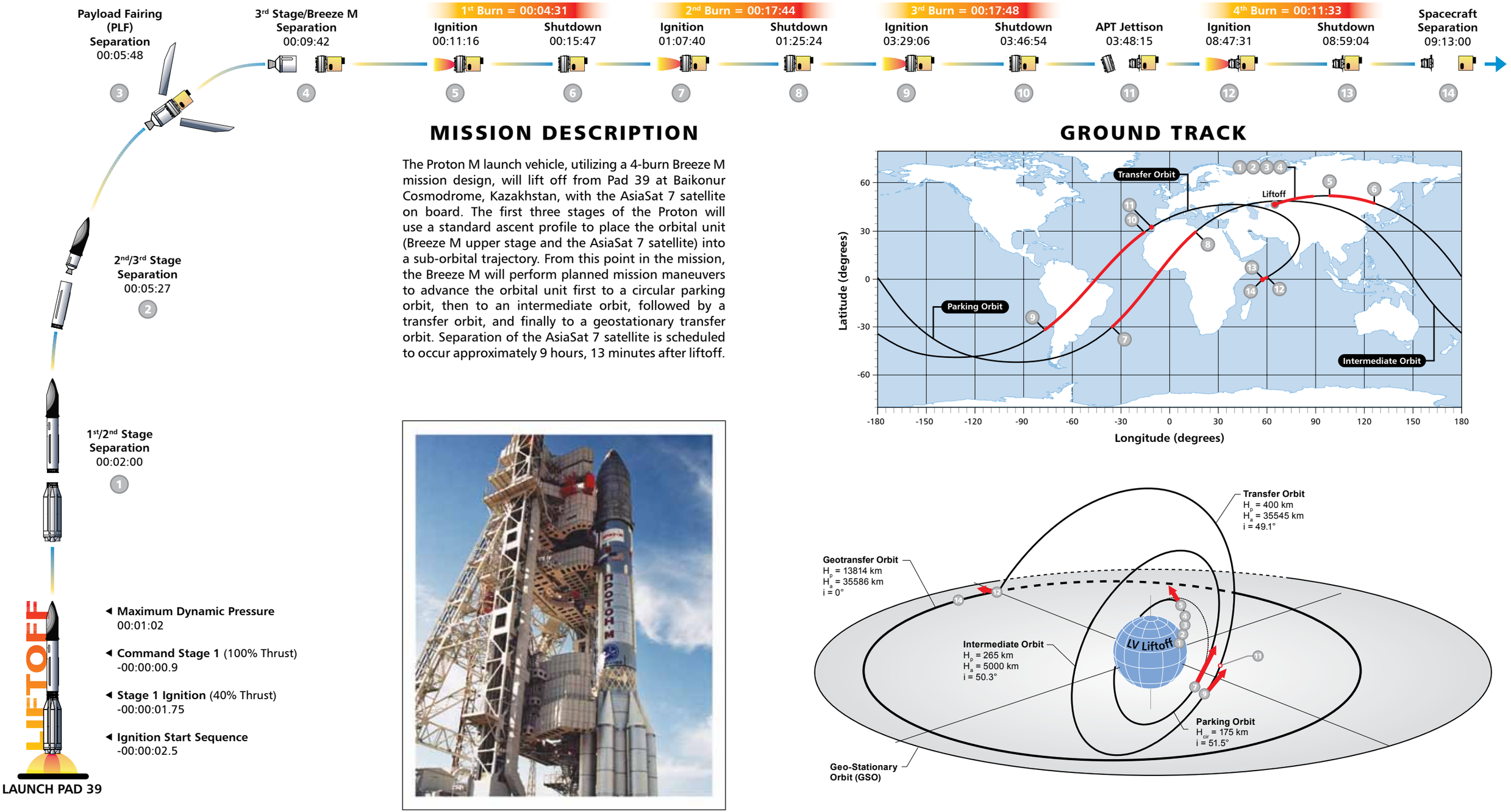
Experience ILS: Achieve Your Mission
QUALITY | PERFORMANCE | EXPERIENCE | DEDICATION

www.ilslaunch.com

AsiaSat 7

- **4th** AsiaSat Satellite Launched on ILS Proton
- **20th** Space Systems/Loral Satellite Launched on ILS Proton
- **5th** ILS Proton Launch in 2011
- **69th** ILS Proton Launch Overall

THE **MISSION**



ASCENT PROFILE

MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 4-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the AsiaSat 7 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the AsiaSat 7 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geostationary transfer orbit. Separation of the AsiaSat 7 satellite is scheduled to occur approximately 9 hours, 13 minutes after liftoff.

PROTON ON PAD 39

GROUND TRACK

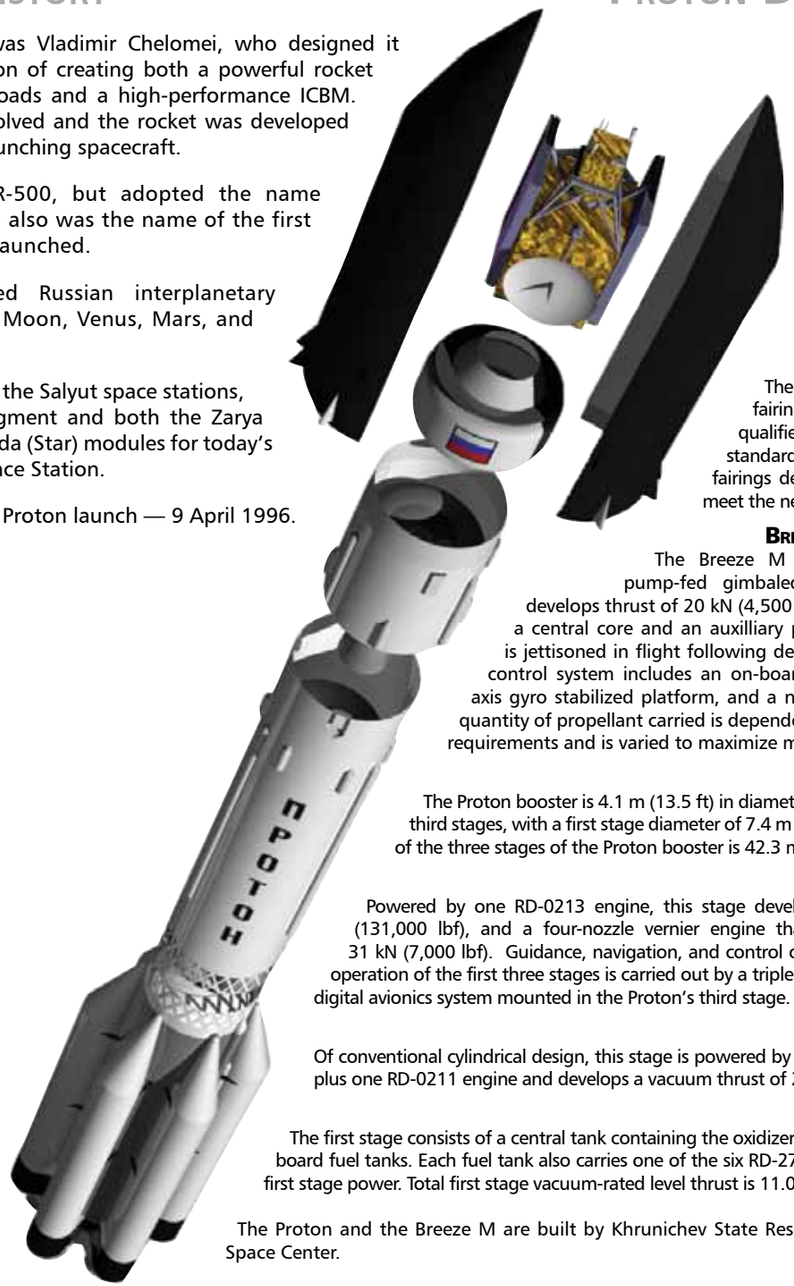
FLIGHT DESIGN

THE VEHICLE

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program evolved and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.

Proton Description



Total Height
58.2 m (191 ft)

Gross Liftoff Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

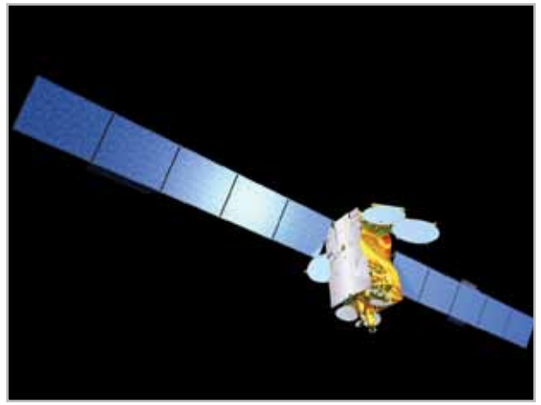
Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE SATELLITE



Satellite Operator
ARABSAT
www.arabsat.com

Satellite Manufacturers
EADS Astrium
www.astrium.eads.net

Thales Alenia Space
www.thalesaleniaspace.com

Platform
Eurostar E3000

Separated Mass
5420 kg

Satellite Design Life
15 Years

Satellite Mission
BADR-5 will be co-located with BADR-4 and BADR-6 Direct-To-Home satellites at ARABSAT's 26° east longitude video "hot-spot". This newest satellite will guarantee to ARABSAT's broadcasting customers a unique "hot" redundancy, the highest level of service provided within the MENA region. Complementary capability will include supporting the projected expansion of HD-TV broadcast and the development of sophisticated interactive services.

ILS
www.ilslaunch.com

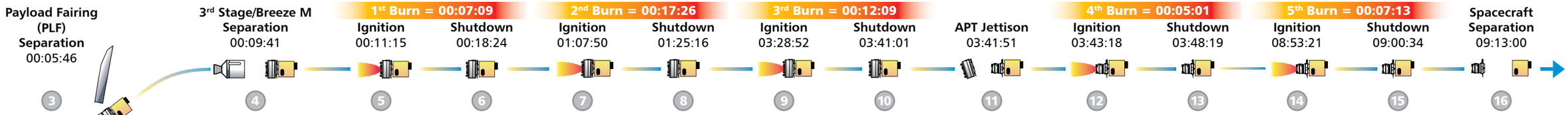
BADR-5

Mission Overview

- **6th** Proton Launch in 2010
- **4th** ILS Proton Launch in 2010
- **60th** Proton Launch for ILS
- **3rd** ARABSAT Launch with ILS
- **12th** Eurostar Satellite Launched on ILS/Proton

KHRUNICHEV STATE RESEARCH AND PRODUCTION SPACE CENTER

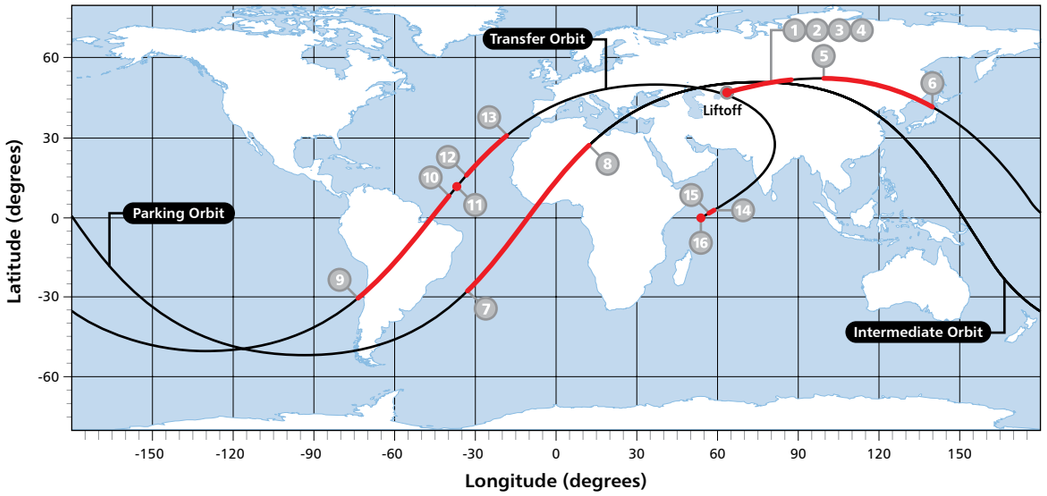
THE **MISSION**

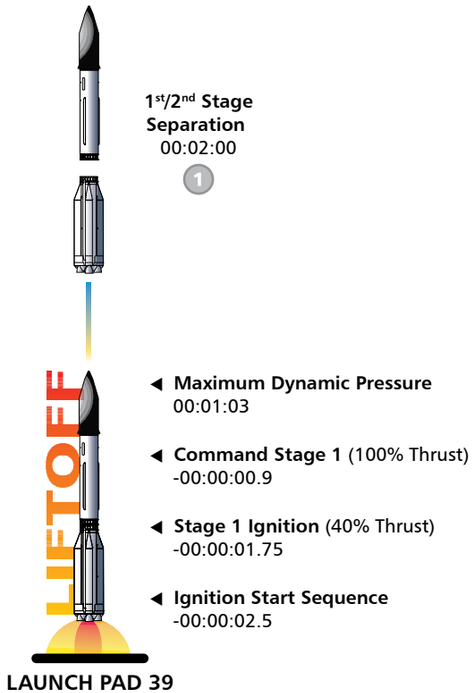


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the BADR-5 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the BADR-5 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geosynchronous transfer orbit. Separation of the BADR-5 satellite is scheduled to occur approximately 9 hours, 13 minutes after liftoff.

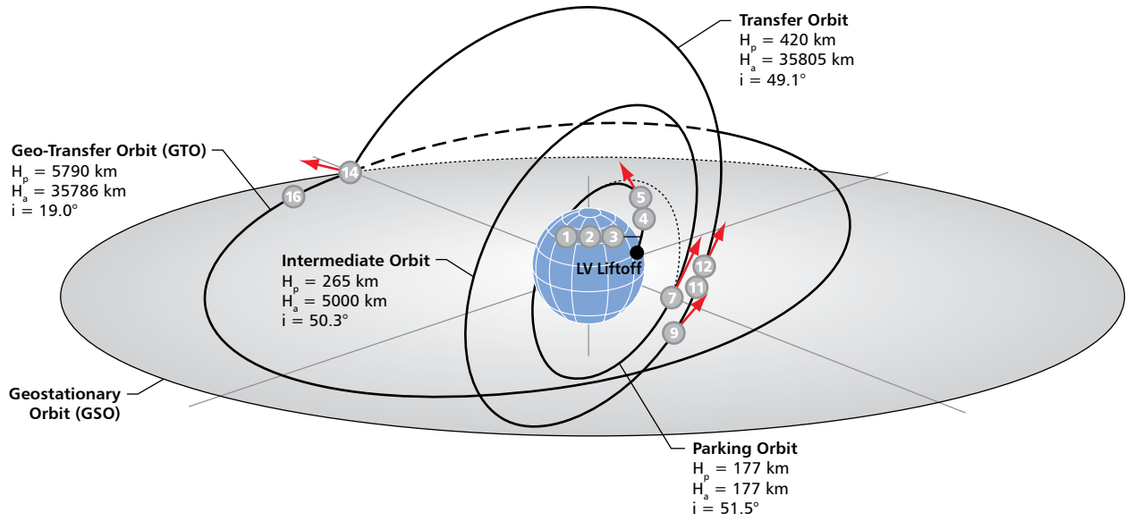
GROUND TRACK





ASCENT PROFILE

PROTON ON PAD 39



FLIGHT DESIGN

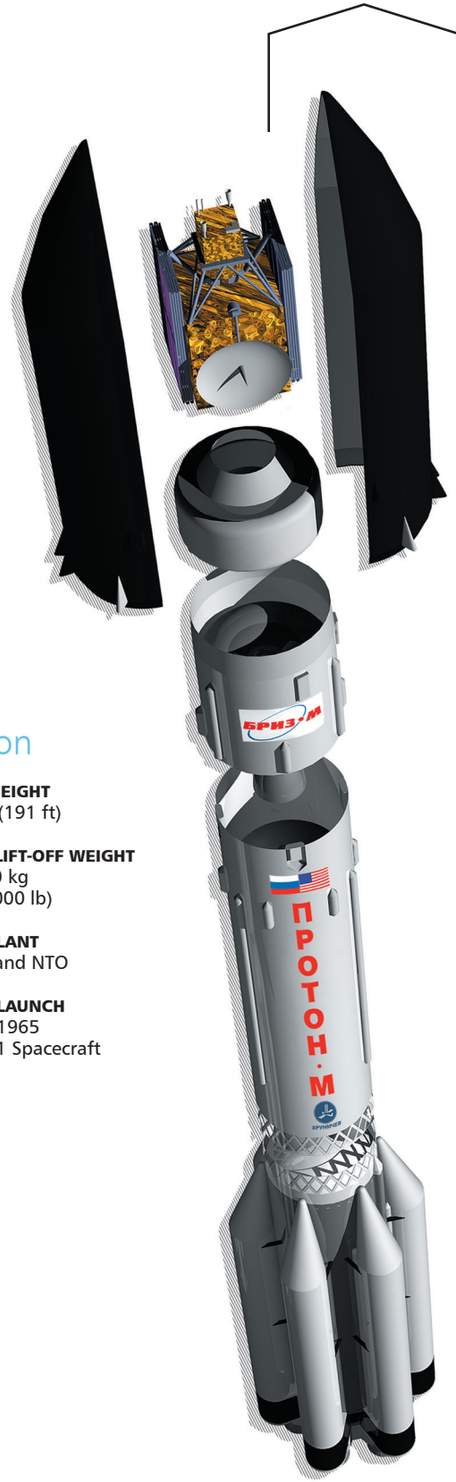
Proton

TOTAL HEIGHT
58.2 m (191 ft)

GROSS LIFT-OFF WEIGHT
705,000 kg
(1,554,000 lb)

PROPELLANT
UDMH and NTO

INITIAL LAUNCH
16 July 1965
Proton-1 Spacecraft



PAYLOAD FAIRINGS

There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

BREEZE M UPPER STAGE

The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxiliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

PROTON BOOSTER

The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

Satellite

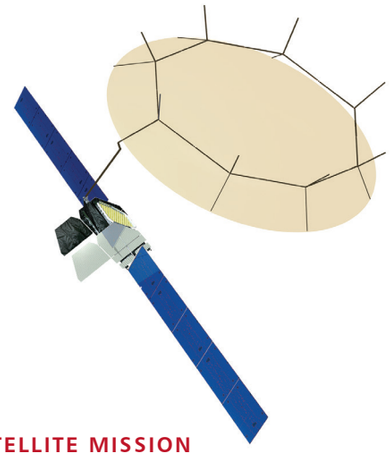
SATELLITE OPERATOR
SCT
www.sct.gob.mx
TELECOMM
www.telecomm.net.mx

SATELLITE MANUFACTURER
Boeing Satellite Systems International
www.boeing.com

PLATFORM
BSS-702HP GEM

SEPARATED MASS
5325 kg

SATELLITE MISSION LIFETIME
15 Years



SATELLITE MISSION

The Mexsat 1 satellite, called CENTENARIO in honor of the 100th anniversary of the Mexican Revolution, is part of an end-to-end satellite communications system that provides 3.5G full IP communications services for voice, data, video and internet access in remote areas to terminals across multiple platforms. This system consists of three satellites, two ground sites and associated network operations. It is Mexico's next-generation satellite communications system.

The Centenario is a fourth generation 702HP GEM geomobile Boeing satellite to serve Mexico, and will offer mobile satellite services to support national security, civil and humanitarian efforts. The Centenario will provide disaster relief, emergency services, telemedicine, rural education, and government agency operations.

It will supply 14 kilowatts of power through 5-panel solar array wings using high-efficiency ultra triple-junction gallium arsenide solar cells. It carries a 22-meter L-band reflector that enables connectivity to handheld terminals, complemented by a 2-meter Ku-band antenna.

Mission Overview

- **1st** SCT Satellite Launched on ILS Proton
- **2nd** ILS Proton Launch in 2015
- **89th** ILS Proton Launch Overall
- **12th** Boeing Satellite Launched on ILS Proton

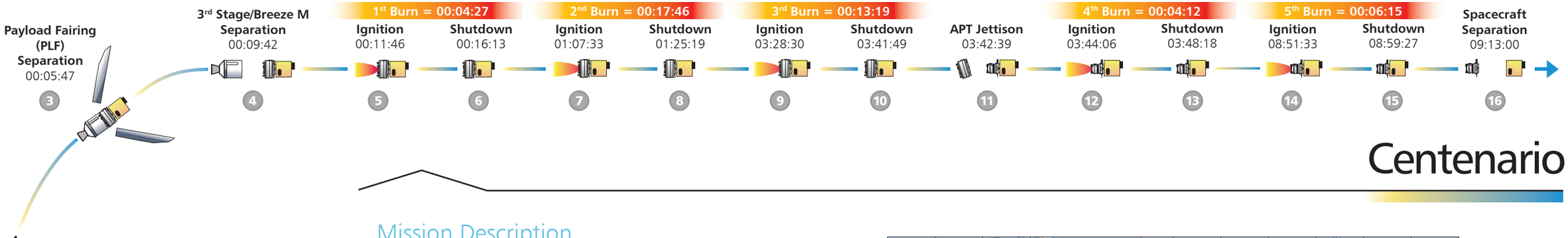
Centenario

ILS

SCT
SECRETARÍA DE COMUNICACIONES Y TRANSPORTES

Telecomm

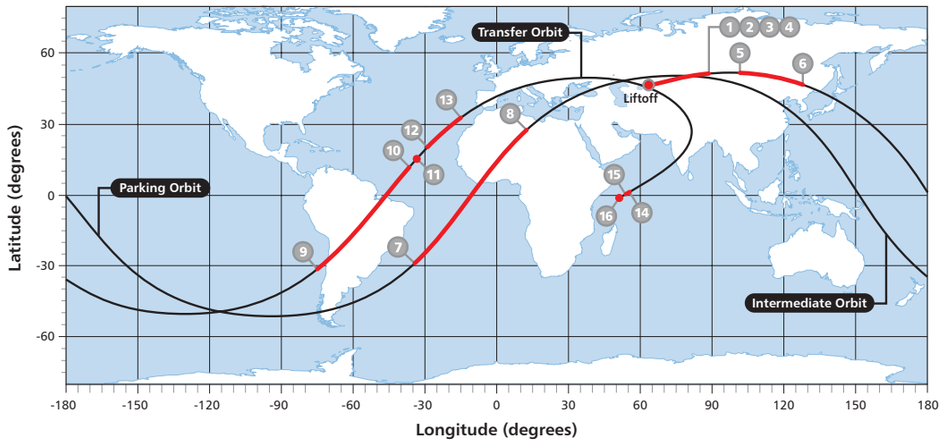
www.ilslaunch.com



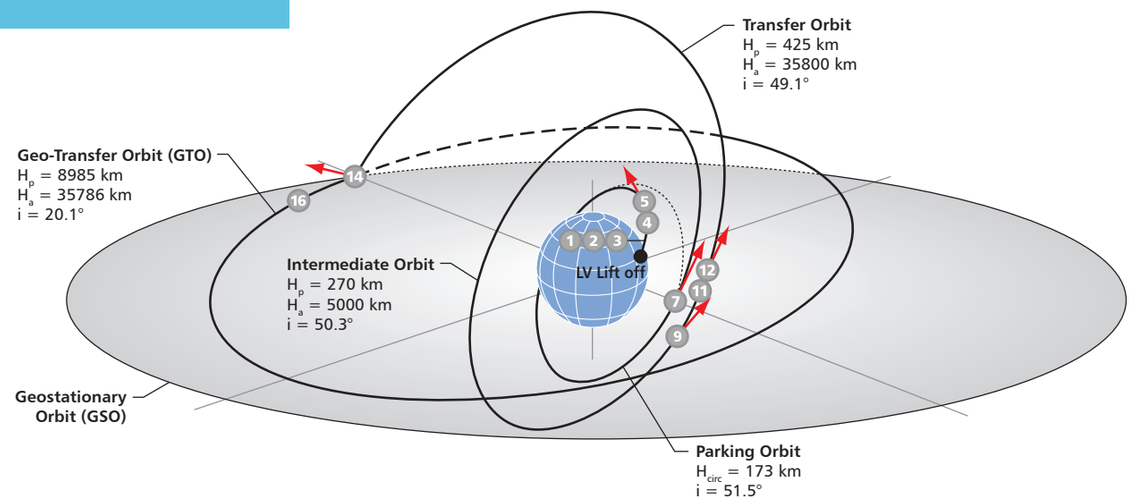
Centenario

Mission Description

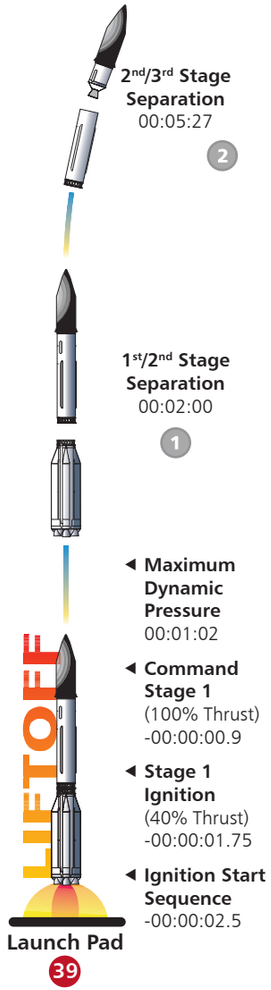
The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at the Baikonur Cosmodrome in Kazakhstan, with the Centenario satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the Centenario satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geosynchronous transfer orbit. Separation of the Centenario satellite is scheduled to occur approximately 9 hours, 13 minutes after liftoff.



Ground Track



Flight Design



- **Maximum Dynamic Pressure**
  00:01:02
- **Command Stage 1**
  (100% Thrust)
  -00:00:00.9
- **Stage 1 Ignition**
  (40% Thrust)
  -00:00:01.75
- **Ignition Start Sequence**
  -00:00:02.5

Launch Pad
39

Ascent Profile

Proton History

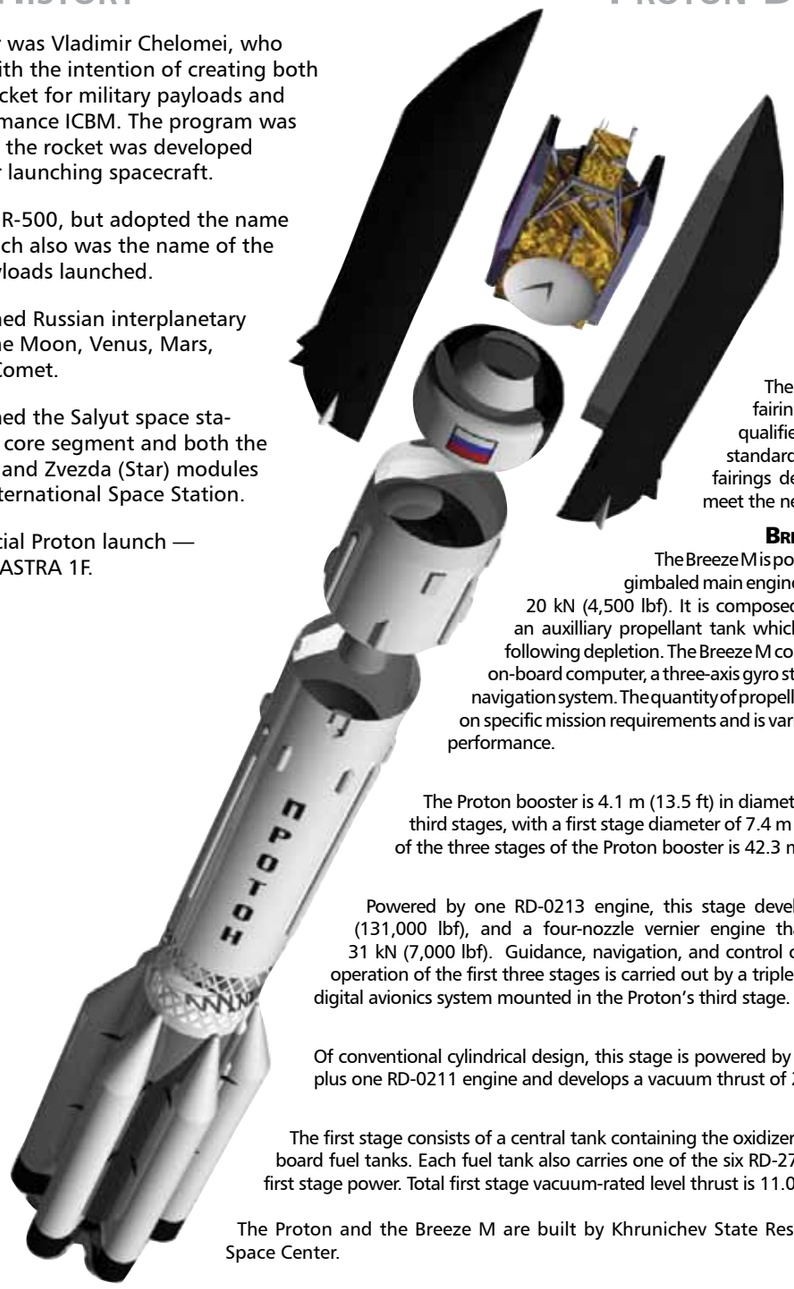
- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name “Proton,” which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley’s Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today’s International Space Station.
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002
- 400th Proton launch — 15 December 2014

THE VEHICLE

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996, ASTRA 1F.

Proton Description



Total Height
58.2 m (191 ft)

Gross Liftoff Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

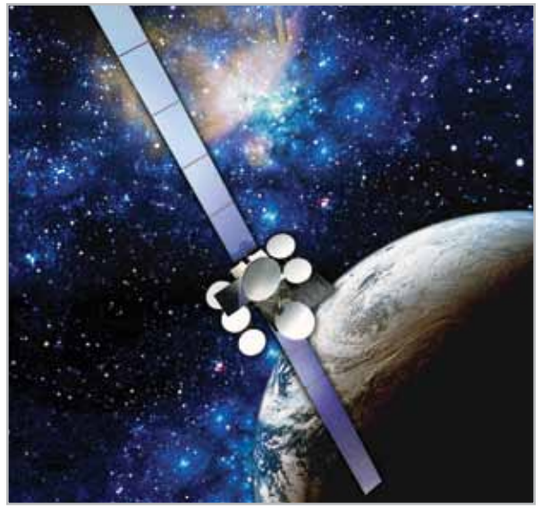
Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE SATELLITE



Satellite Operator
DIRECTV
www.directv.com

Satellite Manufacturer
Boeing Space & Intelligence Systems
www.boeing.com

Platform
702

Separated Mass
5900 kg

Satellite Design Life
15 Years

Satellite Mission
The DIRECTV 12 next-generation satellite will play an important role in extending DIRECTV's content leadership position in the pay TV industry. When it becomes operational in the first half of next year, it will expand DIRECTV's HD capacity by 50 percent to more than 200 national channels and enable DIRECTV to deliver 1,500 local HD and digital channels and more advanced services for its customers nationwide. The powerful 131-transponder payload integrates 32 active and 12 spare TWTAs (Traveling Wave Tube Amplifiers) at Ka-band for national service and 55 active and 15 spare TWTAs for spot beams. The payload is powered by a gallium arsenide solar array that spans more than 48 meters. DIRECTV 12 will receive and transmit programming throughout the United States with two large Ka-band reflectors, each measuring 2.8 meters in diameter and nine other Ka-band reflectors.

ILS

www.ilslaunch.com

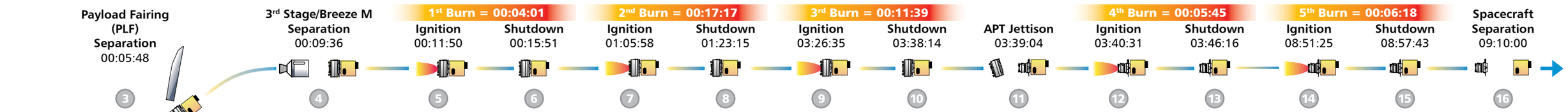
DIRECTV 12

Mission Overview

- **7th** ILS Proton Launch of 2009
- **56th** Proton Launch for ILS
- **4th** DIRECTV Satellite Launched with ILS Proton
- **13th** Boeing Satellite Launched on a Proton

KHRUNICHEV STATE RESEARCH AND PRODUCTION SPACE CENTER

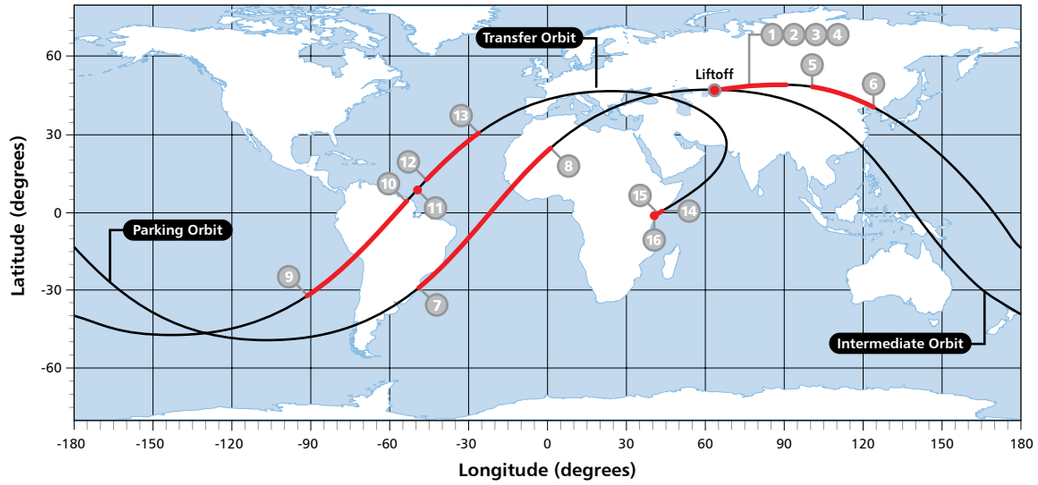
THE **MISSION**

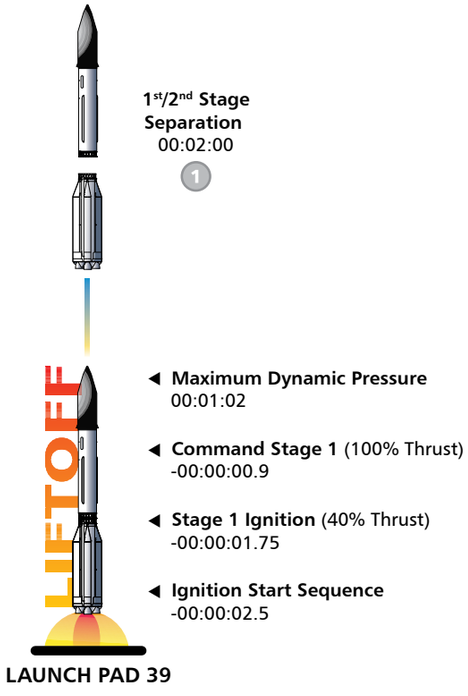


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the DIRECTV 12 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the Ascent Unit (payload fairing, Breeze M upper stage and the DIRECTV 12 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the Orbital Unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geo-transfer orbit. Separation of the DIRECTV 12 satellite is scheduled to occur approximately 9 hours, 10 minutes after liftoff.

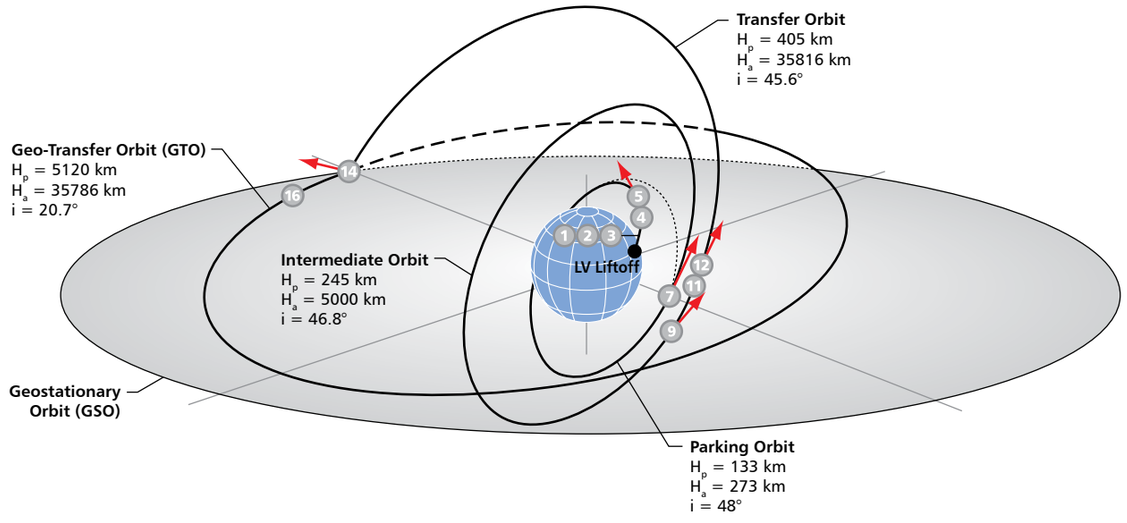
GROUND TRACK



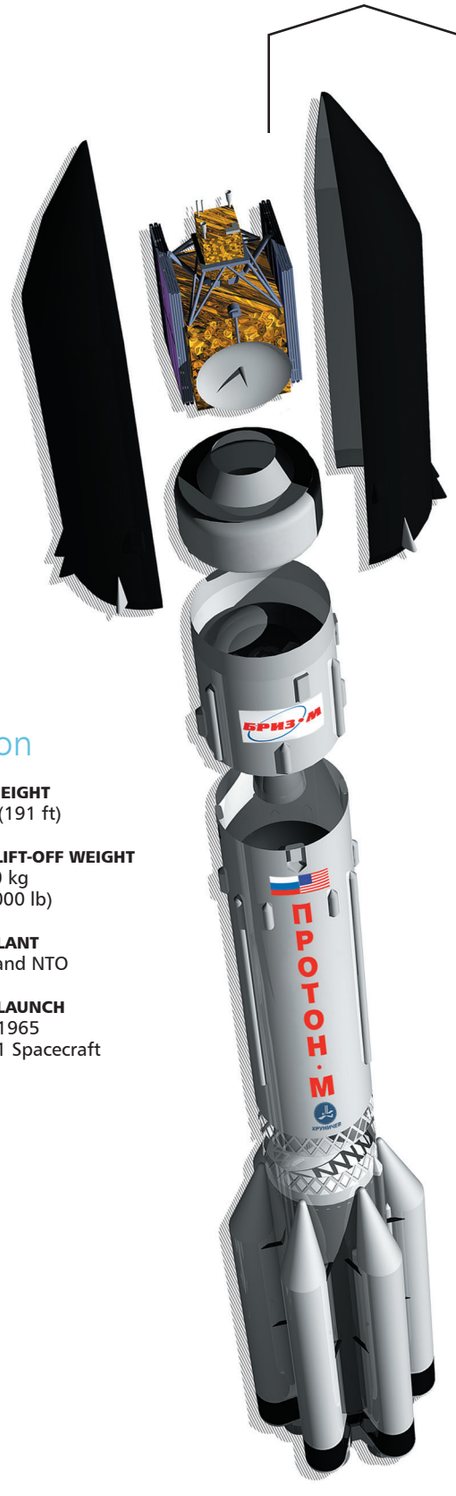


ASCENT PROFILE

PROTON ON PAD 39



ORBIT INSERTION



Proton

TOTAL HEIGHT
58.2 m (191 ft)

GROSS LIFT-OFF WEIGHT
705,000 kg
(1,554,000 lb)

PROPELLANT
UDMH and NTO

INITIAL LAUNCH
16 July 1965
Proton-1 Spacecraft

PAYLOAD FAIRINGS

There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

BREEZE M UPPER STAGE

The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxiliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

PROTON BOOSTER

The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

Satellite

SATELLITE OPERATOR
Eutelsat S.A
www.eutelsat.com

SATELLITE MANUFACTURER
Airbus Defence and Space
www.airbus.com

PLATFORM
Eurostar 3000

SEPARATED MASS
5162 kg

SATELLITE DESIGN LIFETIME
15 Years

SATELLITE MISSION

EUTELSAT 9B is a high-capacity Ku-band satellite to be located at Eutelsat's 9° East position. The 56-transponder satellite will take 9° East to a new level of performance, increasing resources by 12 additional transponders. Capacity will be spread across five footprints, with frequency reuse optimising overall bandwidth. EUTELSAT 9B will address high-growth digital TV markets through one pan-European footprint delivering wide coverage and four regional footprints.

EUTELSAT 9B also hosts the first data relay payload for the European Data Relay System (EDRS) being implemented through a Public Private Partnership (PPP) between ESA and Airbus Defence & Space.

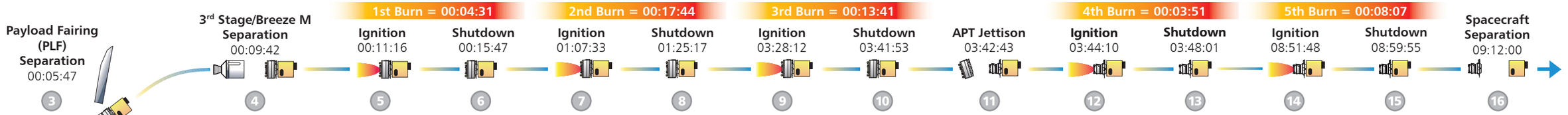
Mission Overview

- 1st ILS Proton Launch in 2016
- 92nd ILS Proton Launch Overall
- 11th Eutelsat Satellite Launched on ILS Proton
- 21st Airbus Satellite Launched on ILS Proton

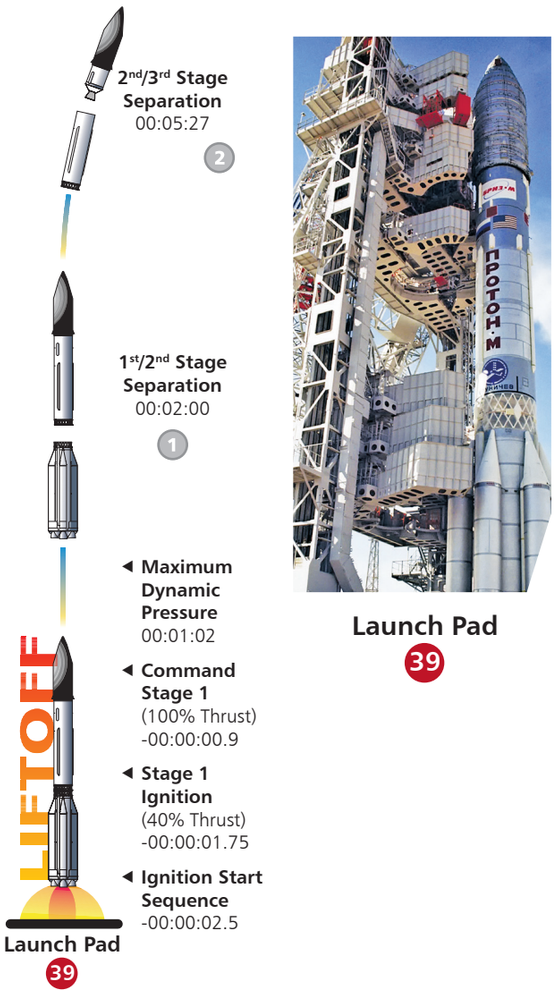
EUTELSAT 9B

ILS

www.ilslaunch.com



EUTELSAT 9B



Ascent Profile

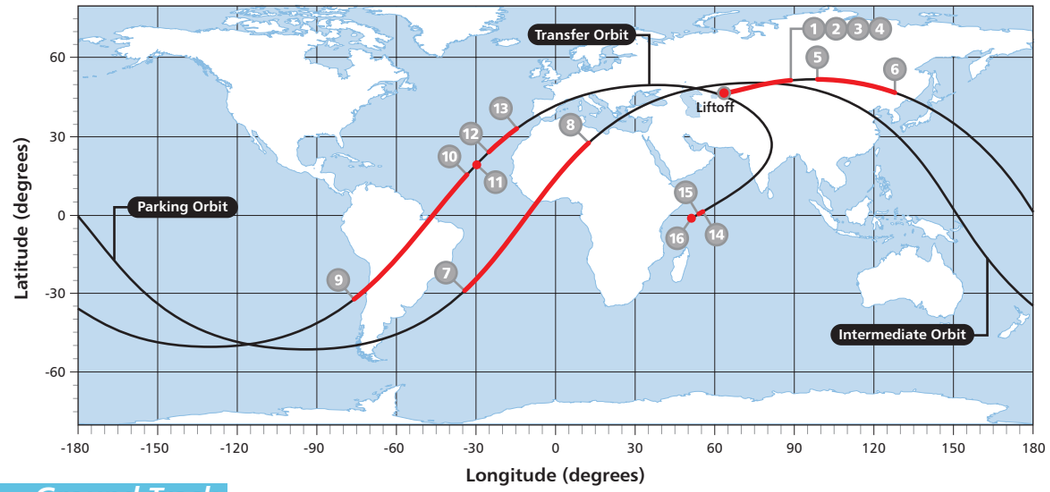
Launch Pad
39

Mission Description

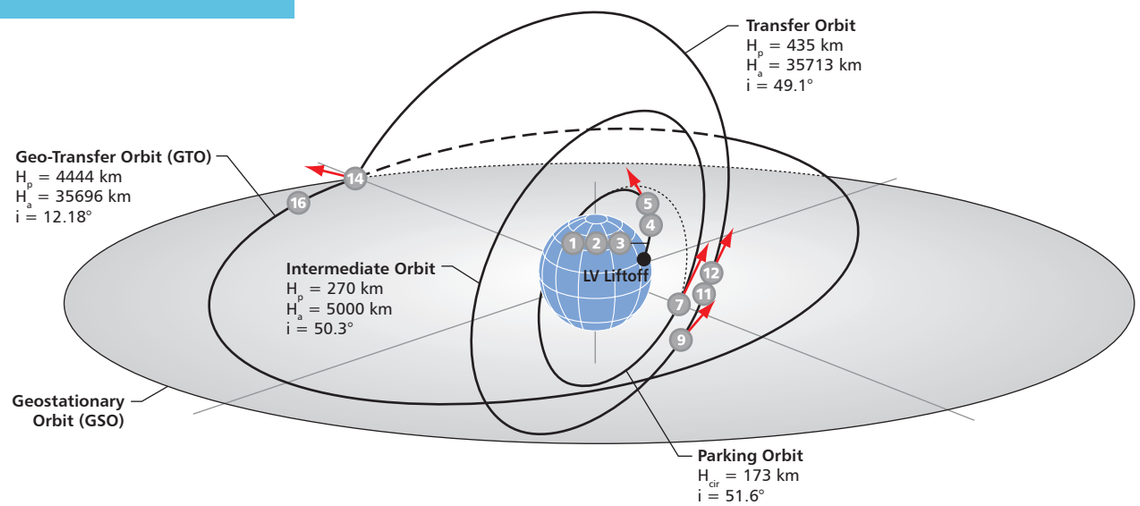
The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at the Baikonur Cosmodrome in Kazakhstan, with the EUTELSAT 9B satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the EUTELSAT 9B satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geosynchronous transfer orbit. Separation of the EUTELSAT 9B satellite is scheduled to occur approximately 9 hours, 12 minutes after liftoff.

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M\Breeze M launch — 30 December 2002
- 400th Proton launch — 15 December 2014
- 50th year in service in 2015



Ground Track

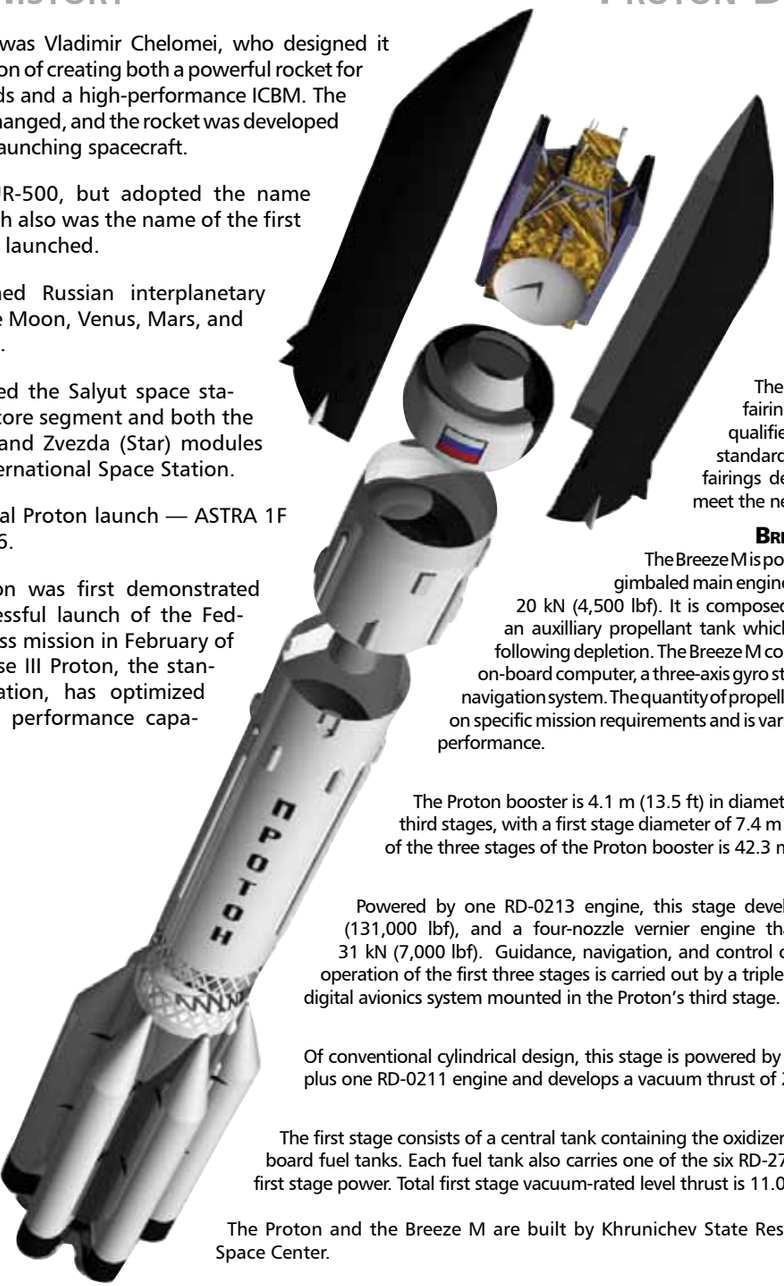


Flight Design

THE VEHICLE

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — ASTRA 1F on 9 April 1996.
- Phase III Proton was first demonstrated with the successful launch of the Federal dual Express mission in February of 2009. The Phase III Proton, the standard configuration, has optimized GTO and GSO performance capabilities.



Proton Description

Total Height
58.2 m (191 ft)

Gross Liftoff Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE SATELLITE

Satellite Operator
EchoStar
www.echostar.com

End User
Dish Network
www.dishnetwork.com

Satellite Manufacturer
Space Systems/Loral
www.ssloral.com

Platform
SS/L 1300

Separated Mass
6379 kg

Satellite Design Life
15 Years

Satellite Mission
The EchoStar XIV satellite will join DISH Network's fleet of satellites that serve more than 14 million satellite TV customers in the U.S. From its location at 119 degrees west longitude, EchoStar XIV will provide Ku-band services over the continental United States. The DISH Network fleet has the capacity to deliver the highest quality programming and technology at the best value, including the lowest all-digital price nationwide. Customers have access to hundreds of video and audio channels, the most HD channels, the most international channels, state-of-the-art interactive TV applications, and award-winning HD and DVR technology including 1080p Video on Demand.

ILS

www.ilslaunch.com

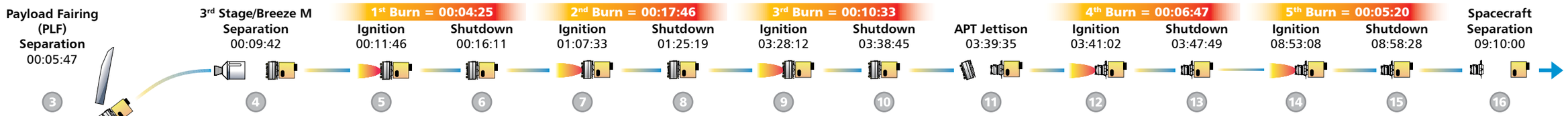
EchoStar XIV

Mission Overview

- **2nd** ILS/Proton Launch in 2010
- **58th** ILS/Proton Launch
- **3rd** EchoStar Satellite Launched on ILS/Proton
- **14th** Space Systems/Loral Satellite Launched on a Proton

KHRUNICHEV STATE RESEARCH AND PRODUCTION SPACE CENTER

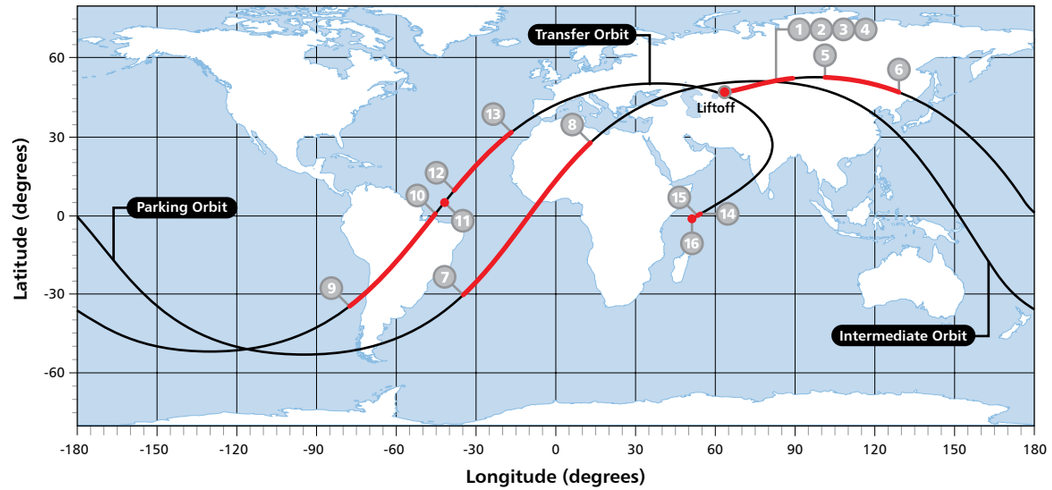
THE **MISSION**

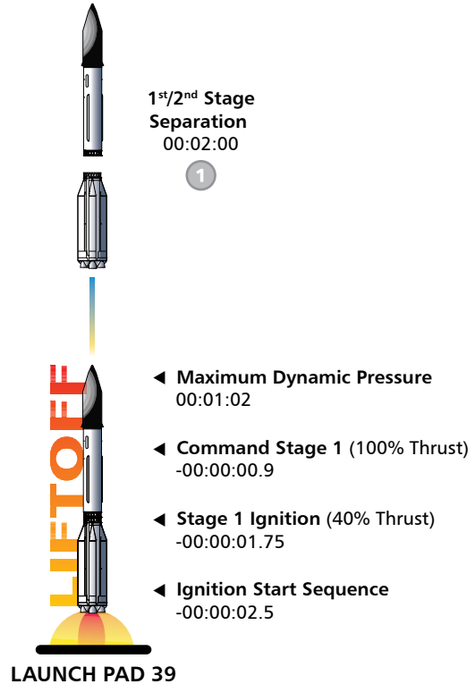


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the EchoStar XIV satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the EchoStar XIV satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geosynchronous transfer orbit. Separation of the EchoStar XIV satellite is scheduled to occur approximately 9 hours, 10 minutes after liftoff.

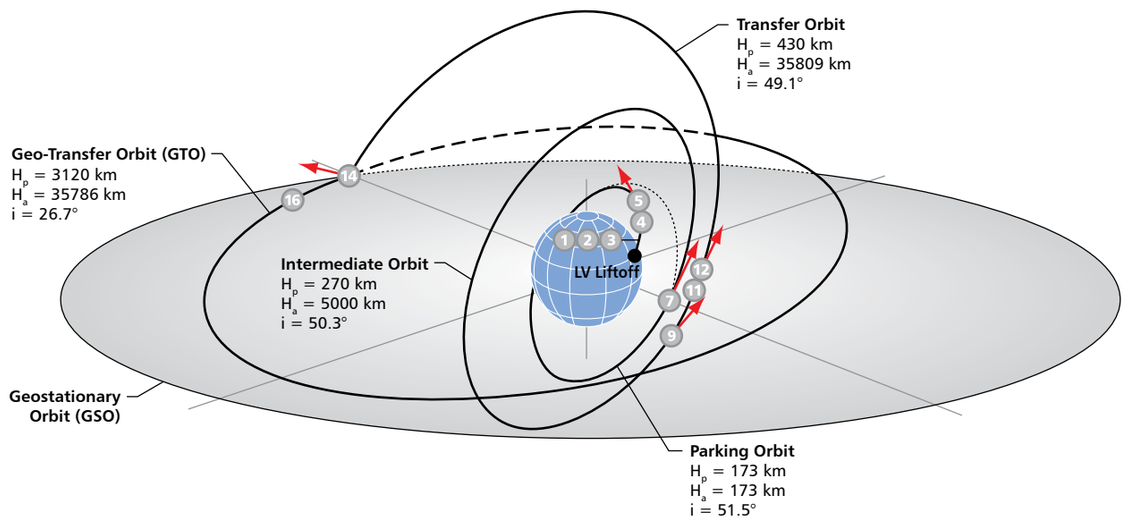
GROUND TRACK





ASCENT PROFILE

PROTON ON PAD 39

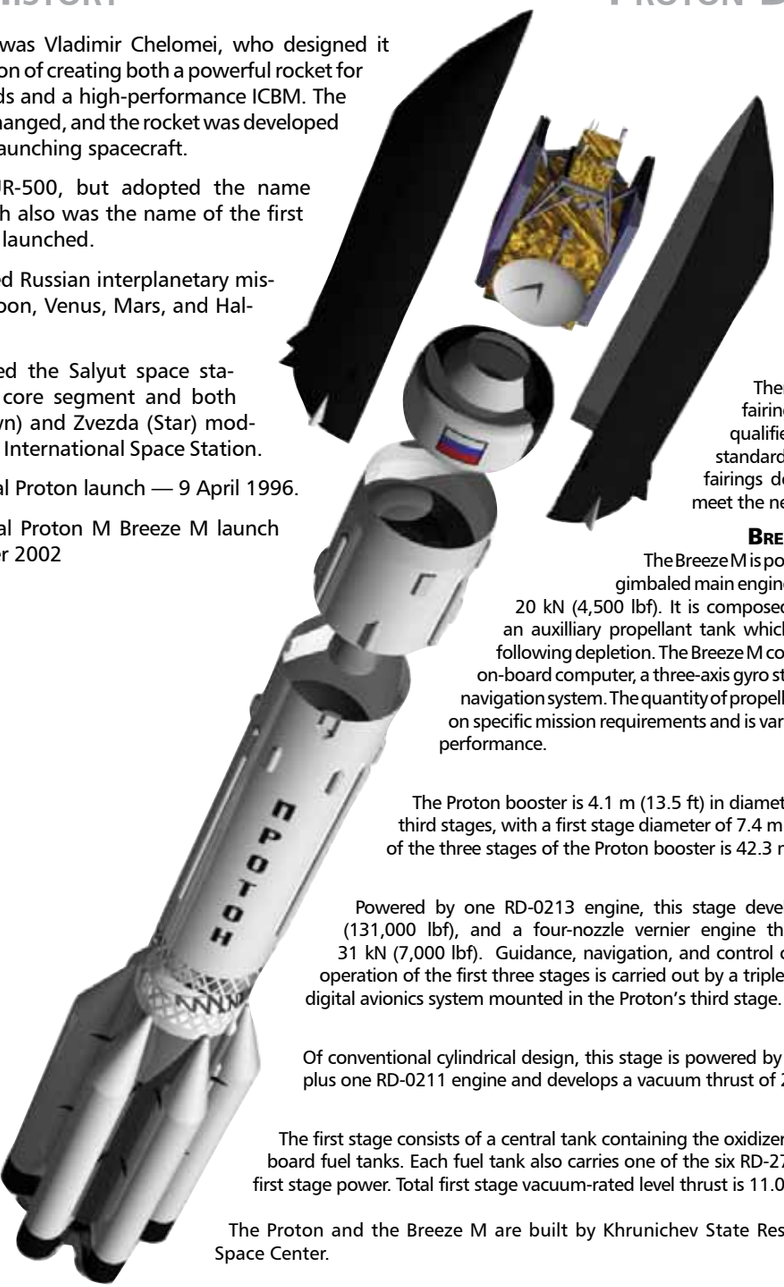


FLIGHT DESIGN

THE **VEHICLE**

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002



Proton Description

Total Height
58.2 m (191 ft)

Gross Lift-off Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

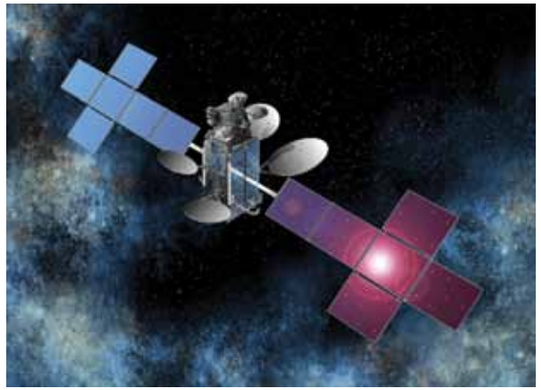
Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE **SATELLITE**



Satellite Operator
EchoStar
www.echostar.com

Satellite Manufacturer
Space Systems/Loral
www.ssloral.com

Platform
SS/L 1300

Separated Mass
6650 kg

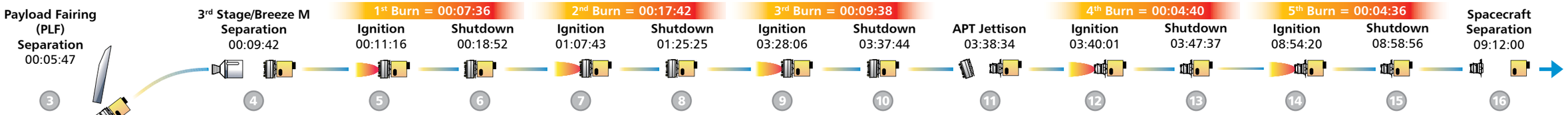
Satellite Mission Lifetime
15 Years

Satellite Mission
EchoStar XVI will join EchoStar's fleet of satellites that power global communication, commerce and entertainment. Operated by EchoStar, EchoStar XVI will be fully leased to DISH for use in its Direct-to-Home (DTH) services in the United States. An all Ku-band satellite with CONUS and spot beam transponders, EchoStar XVI will utilize SS/L's flight-proven 1300 spacecraft bus and be located at 61.5° west longitude. EchoStar XVI will further enhance EchoStar's position as the premier global provider of satellite operations and video delivery solutions.

EchoStar XVI

- **7th** ILS Proton Launch in 2012
- **76th** ILS Proton Launch Overall
- **5th** EchoStar Satellite Launched on ILS Proton
- **24th** Space Systems/Loral Satellite Launched on ILS Proton

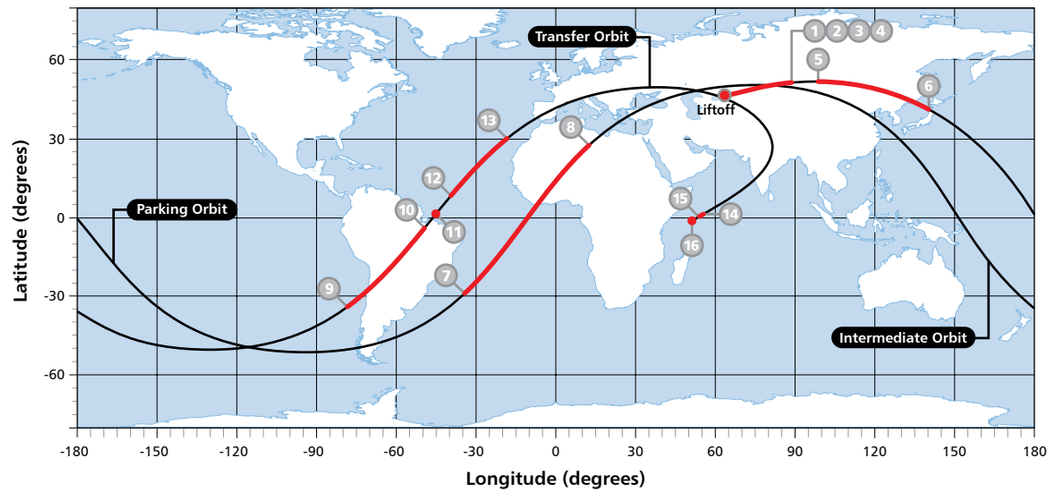
THE **MISSION**

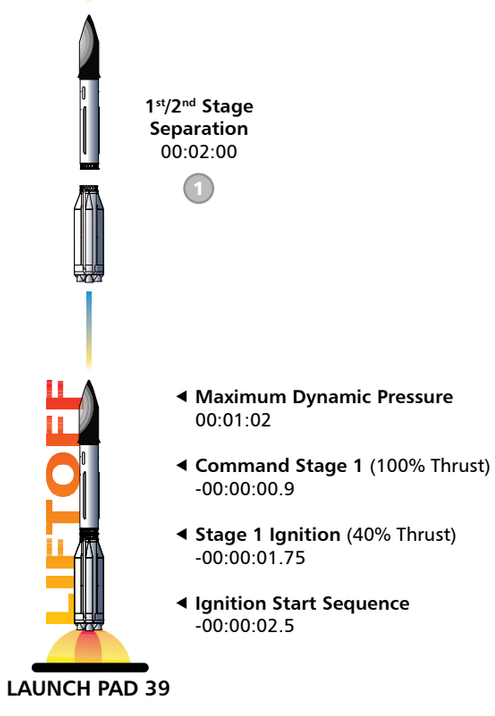


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the EchoStar XVI satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the EchoStar XVI satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geo-stationary transfer orbit. Separation of the EchoStar XVI satellite is scheduled to occur approximately 9 hours, 12 minutes after liftoff.

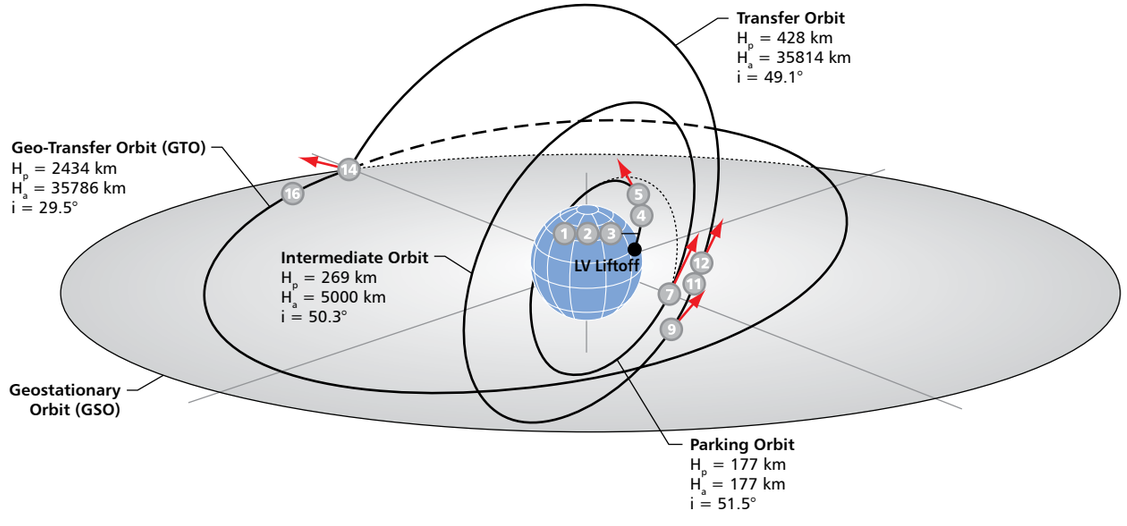
GROUND TRACK





ASCENT PROFILE

PROTON ON PAD 39



FLIGHT DESIGN

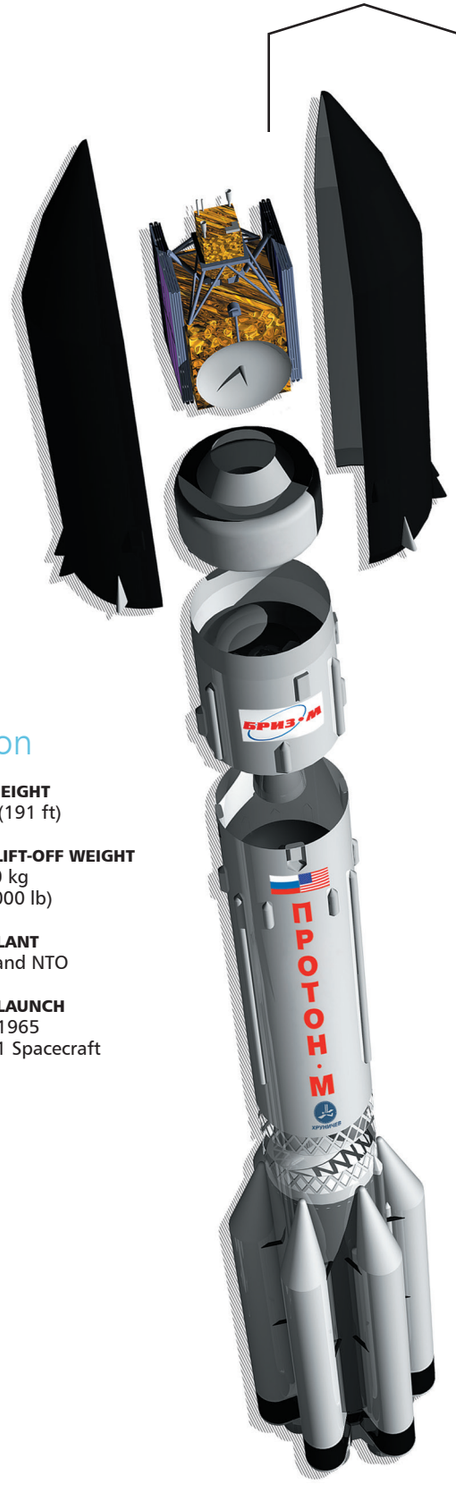
Proton

TOTAL HEIGHT
58.2 m (191 ft)

GROSS LIFT-OFF WEIGHT
705,000 kg
(1,554,000 lb)

PROPELLANT
UDMH and NTO

INITIAL LAUNCH
16 July 1965
Proton-1 Spacecraft



PAYLOAD FAIRINGS

This mission will utilize the standard PLF-BR-15255 commercial payload fairing which is 4.1 meters in diameter and 15.255 meters in length. The PLF encapsulates the EchoStar XXI satellite along with the Breeze M upper stage to provide protection from the dense atmosphere for the first 5 minutes and 45 seconds after launch.

BREEZE M UPPER STAGE

The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxiliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

PROTON BOOSTER

The Proton booster consists of three stages (described below). The overall height of the three stages of Proton is 42.3 meters (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

Satellite

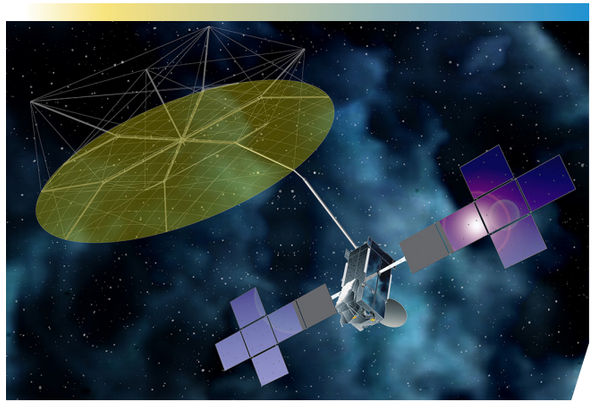
SATELLITE OPERATOR
EchoStar
www.echostar.com

SATELLITE MANUFACTURER
SSL
www.sslmda.com

PLATFORM
SSL 1300

SEPARATED MASS
6900 kg

SATELLITE DESIGN LIFETIME
15 Years



SATELLITE MISSION

EchoStar XXI is a state-of-the-art S-band satellite designed to provide mobile connectivity throughout Europe. The spacecraft, based on SSL's 1300 bus, will be located at the 10.25° East orbital slot. EchoStar subsidiary EchoStar Mobile Limited, an EU-wide licensee for an integrated mobile satellite service network with a complementary ground component, will utilize a portion of the capacity on EchoStar XXI to provision its next-generation, all IP-enabled mobile communications network.

Mission Overview

- **1st** ILS Proton Launch in 2017
- **94th** ILS Proton Launch Overall
- **6th** EchoStar Satellite Launched on ILS Proton
- **29th** SSL Satellite Launched on ILS Proton

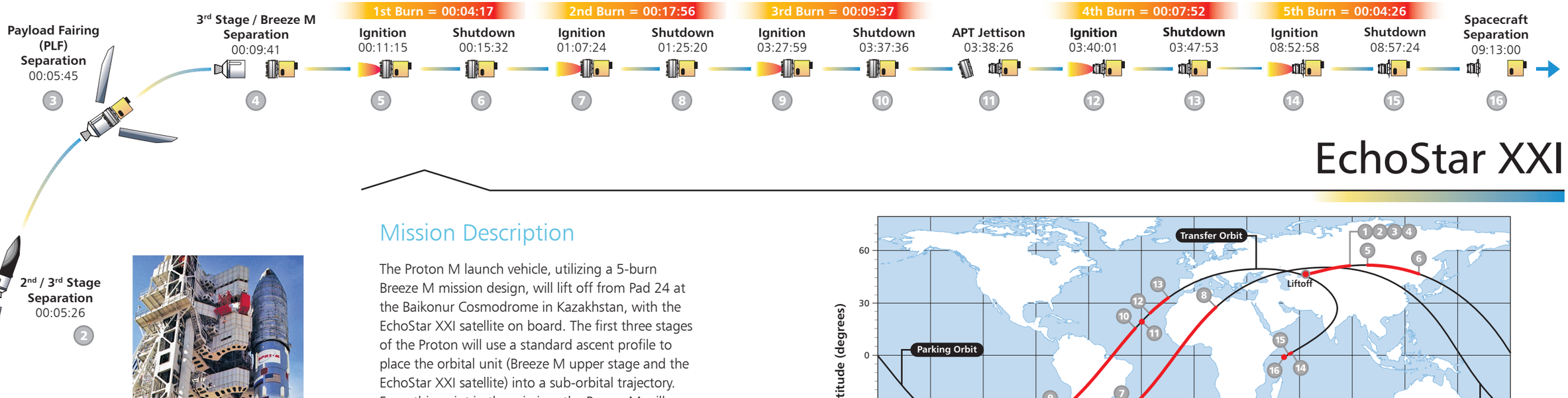
EchoStar XXI

ILS

KHRUNICHEV STATE RESEARCH AND PRODUCTION SPACE CENTER

www.ilslaunch.com

EchoStar XXI



Launch Pad
24

Ascent Profile

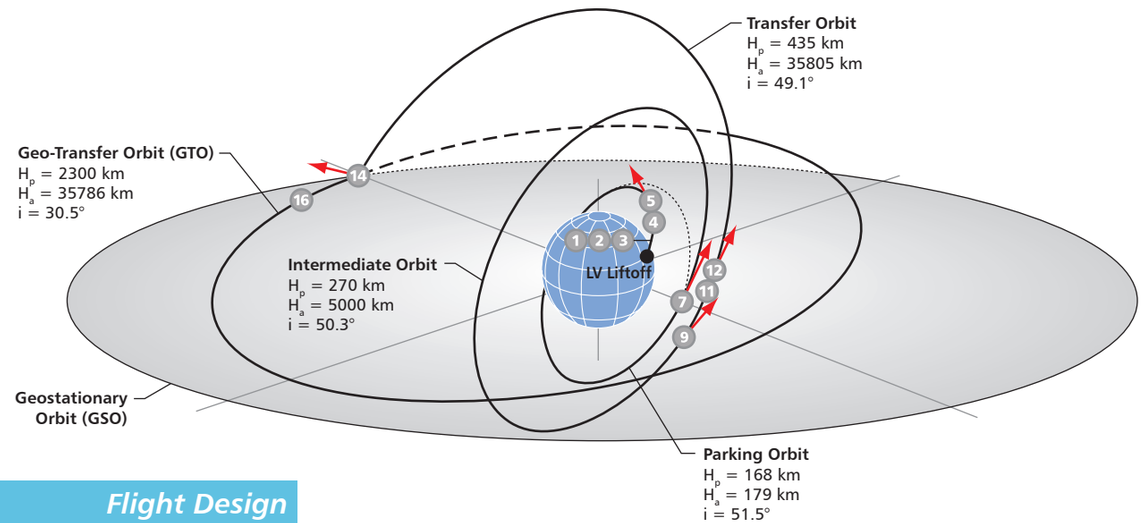
Mission Description

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 24 at the Baikonur Cosmodrome in Kazakhstan, with the EchoStar XXI satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the EchoStar XXI satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a nearly circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geosynchronous transfer orbit. Separation of the EchoStar XXI satellite is scheduled to occur approximately 9 hours, 13 minutes after lift-off.

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name “Proton”, which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley’s Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today’s International Space Station.
- First commercial Proton launch — 9 April 1996
- First commercial Proton M/Breeze M launch — 30 December 2002
- 400th Proton launch — 15 December 2014
- 50th year in service in 2015
- KhSC 100 year anniversary — 30 April 2016

Ground Track



Flight Design

THE **VEHICLE**

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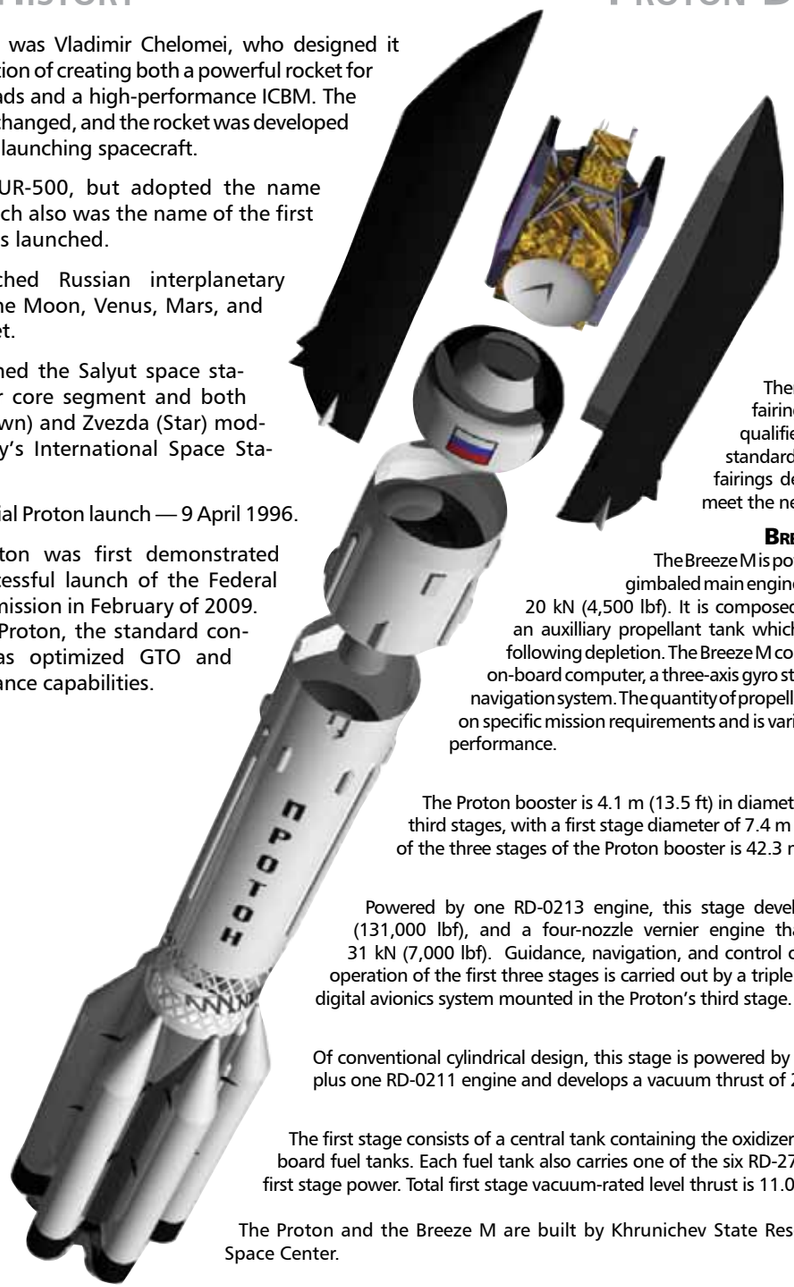

Proton Description

Total Height
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Gross Liftoff Weight
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(1,554,000 lb)

Propellant
UDMH and NTO

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16 July 1965
Proton-1 Spacecraft

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Proton Booster
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Third Stage
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Second Stage
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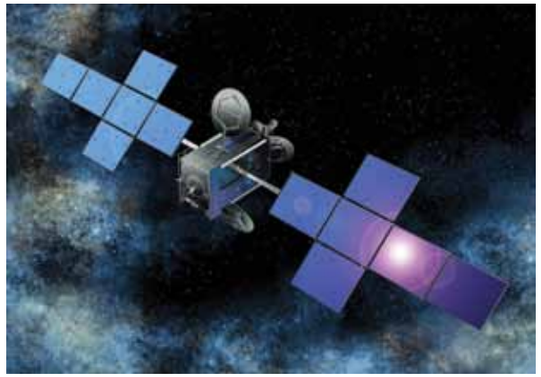
First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE **SATELLITE**



Satellite Operator
EchoStar
www.echostar.com

End User
DISH Network
www.dish.com

Satellite Manufacturer
Space Systems/Loral
www.ssloral.com

Platform
SS/L 1300

Separated Mass
5521 kg

Satellite Design Life
15 Years

Satellite Mission
The EchoStar XV satellite will join DISH Network's fleet of satellites that serve more than 14 million satellite TV customers in the U.S. From its location at 61.5 degrees west longitude, EchoStar XV will provide Ku-band services over the continental United States. The DISH Network fleet has the capacity to deliver the highest quality programming and technology at the best value, including the lowest all-digital price nationwide. Customers have access to hundreds of video and audio channels, the most HD channels, the most international channels, state-of-the-art interactive TV applications, and award winning HD and DVR technology including 1080p Video on Demand.

Mission Overview

ILS

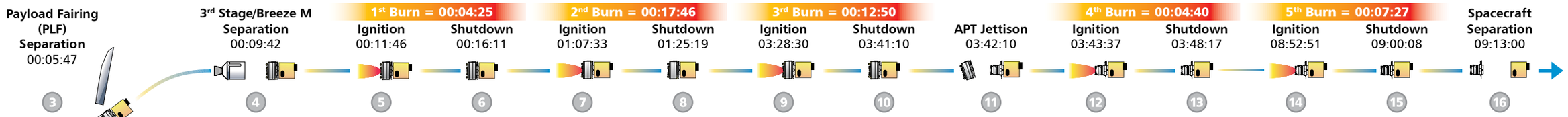
Experience ILS: Achieve Your Mission
QUALITY | PERFORMANCE | EXPERIENCE | DEDICATION

www.ilslaunch.com

EchoStar XV

- **7th** Proton Launch in 2010
- **5th** ILS Proton Launch in 2010
- **61st** ILS Proton Launch
- **4th** EchoStar Satellite Launched on ILS Proton
- **15th** Space Systems/Loral Satellite Launched on a Proton

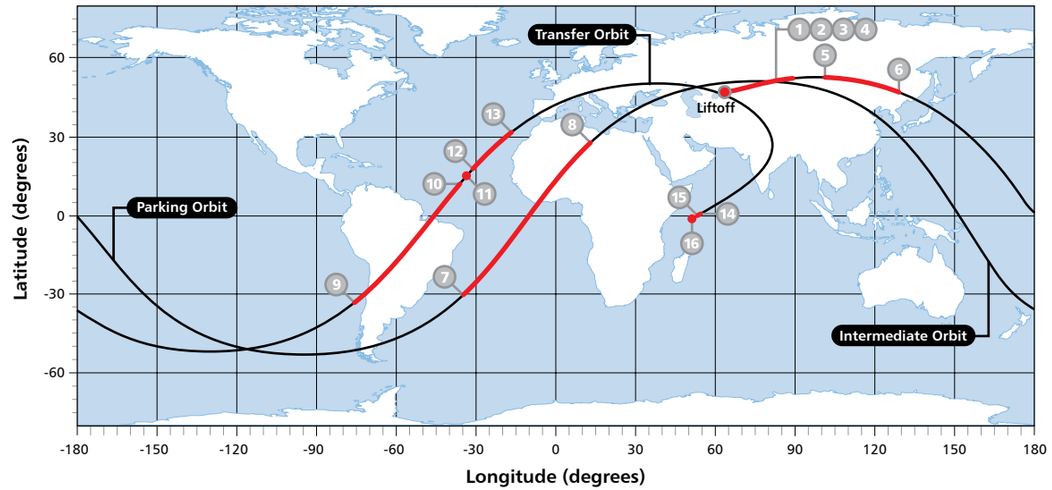
THE **MISSION**

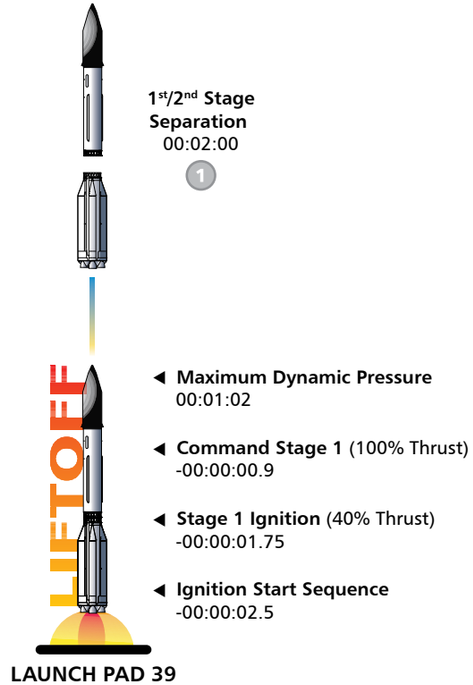


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the EchoStar XV satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the EchoStar XV satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geosynchronous transfer orbit. Separation of the EchoStar XV satellite is scheduled to occur approximately 9 hours, 13 minutes after liftoff.

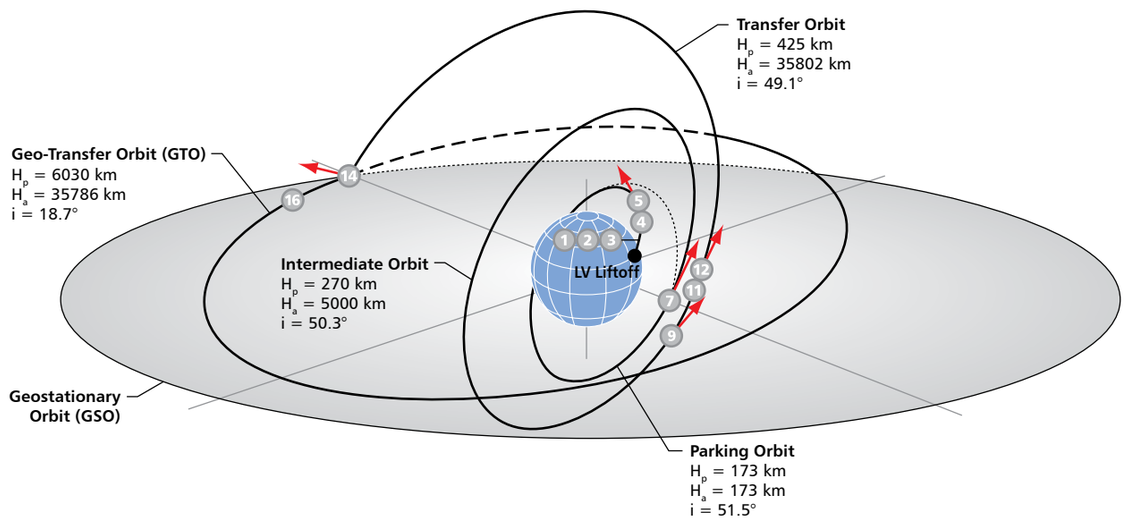
GROUND TRACK





ASCENT PROFILE

PROTON ON PAD 39

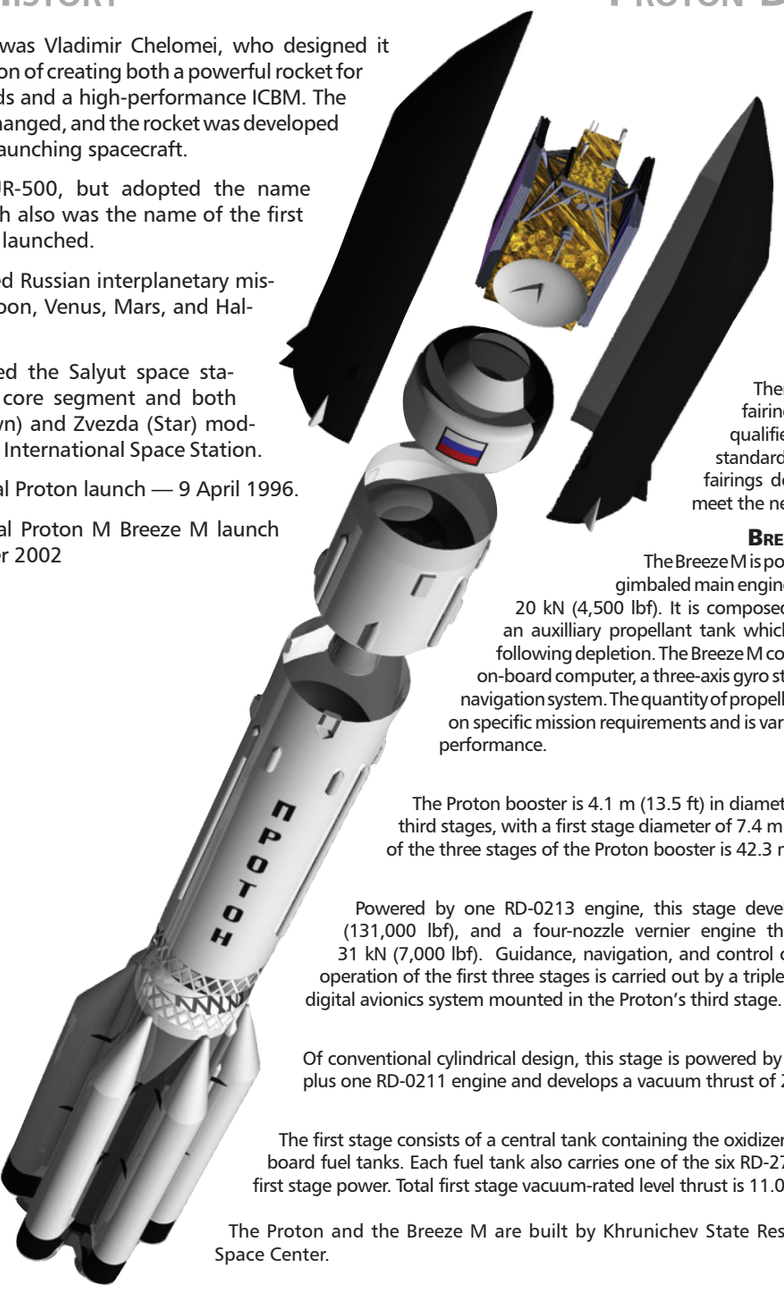


FLIGHT DESIGN

THE **VEHICLE**

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002



Proton Description

Total Height
58.2 m (191 ft)

Gross Lift-off Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE **SATELLITE**

Satellite Operator
Eutelsat Communications
www.eutelsat.com

Satellite Manufacturer
Thales Alenia Space
www.thalesaleniaspace.com

Platform
Spacebus 4000

Separated Mass
5470 kg

Satellite Mission Lifetime
15 Years

Satellite Mission
EUTELSAT 3D will bring resources, reach and flexibility for high-growth professional video, data, telecom and broadband services at 3° East, an orbital position that sits at the crossroads of Europe, Africa and Asia. Through a configuration of Ku and Ka transponders connected to three footprints, Eutelsat's new satellite will serve customers in Europe, North Africa, the Middle East and Central Asia. A fourth footprint in the Ku-band will serve customers in sub-Saharan Africa. EUTELSAT 3D will be located at 3° East until the launch in 2014 of EUTELSAT 3B that will further extend coverage to South America. It will subsequently continue service at 7° East.

Mission Overview

ILS

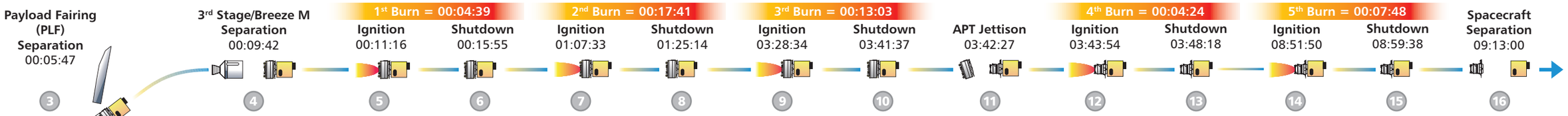
Experience ILS: Achieve Your Mission
QUALITY | PERFORMANCE | EXPERIENCE | DEDICATION

www.ilslaunch.com

EUTELSAT 3D

- **3rd** ILS Proton Launch in 2013
- **80th** ILS Proton Launch Overall
- **7th** Eutelsat Satellite Launched on Proton
- **9th** Thales Alenia Space Satellite Launched on ILS Proton

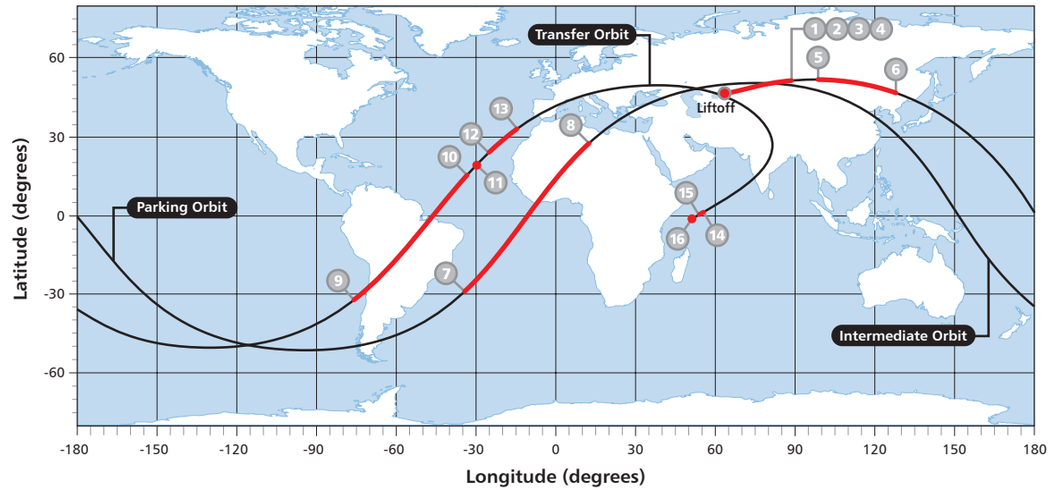
THE **MISSION**

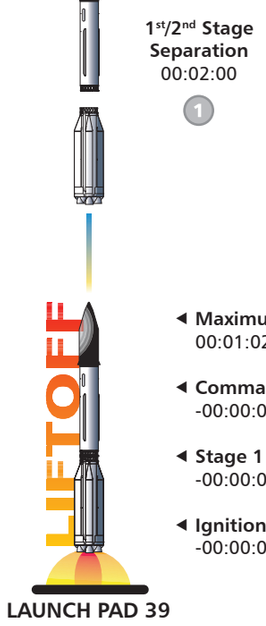


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the EUTELSAT 3D satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the EUTELSAT 3D satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geosynchronous transfer orbit. Separation of the EUTELSAT 3D satellite is scheduled to occur approximately 9 hours, 13 minutes after liftoff.

GROUND TRACK

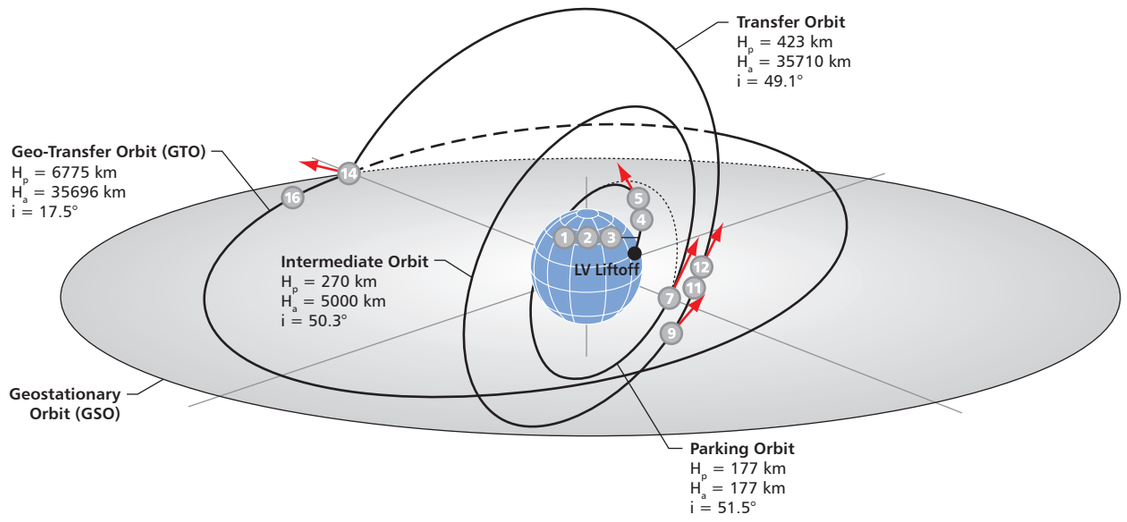




- **Maximum Dynamic Pressure** 00:01:02
- **Command Stage 1** (100% Thrust) -00:00:00.9
- **Stage 1 Ignition** (40% Thrust) -00:00:01.75
- **Ignition Start Sequence** -00:00:02.5

ASCENT PROFILE

PROTON ON PAD 39



FLIGHT DESIGN

Proton

TOTAL HEIGHT
58.2 m (191 ft)

GROSS LIFT-OFF WEIGHT
705,000 kg
(1,554,000 lb)

PROPELLANT
UDMH and NTO

INITIAL LAUNCH
16 July 1965
Proton-1 Spacecraft

PAYLOAD FAIRINGS

There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

BREEZE M UPPER STAGE

The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxiliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

PROTON BOOSTER

The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

Satellite

SATELLITE OPERATOR
Inmarsat
www.inmarsat.com

SATELLITE MANUFACTURER
Boeing Satellite Systems
www.Boeing.com

PLATFORM
BSS-702HP

SEPARATED MASS
6070 kg

SATELLITE MISSION LIFETIME
15 Years

SATELLITE MISSION

Inmarsat Global Xpress (GX) will be the first globally available high-speed broadband network. It will be delivered over three Inmarsat-5 satellites and will offer the unique combination of global coverage from a single operator and the network reliability for which Inmarsat is renowned. Based on Ka-band technology, GX will consistently deliver higher performance through more compact terminals at a lower cost than existing VSAT services, making it accessible to many more users.

Information contained herein is subject to change.

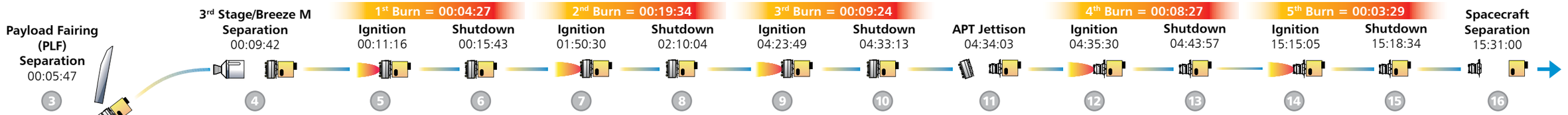
Mission Overview

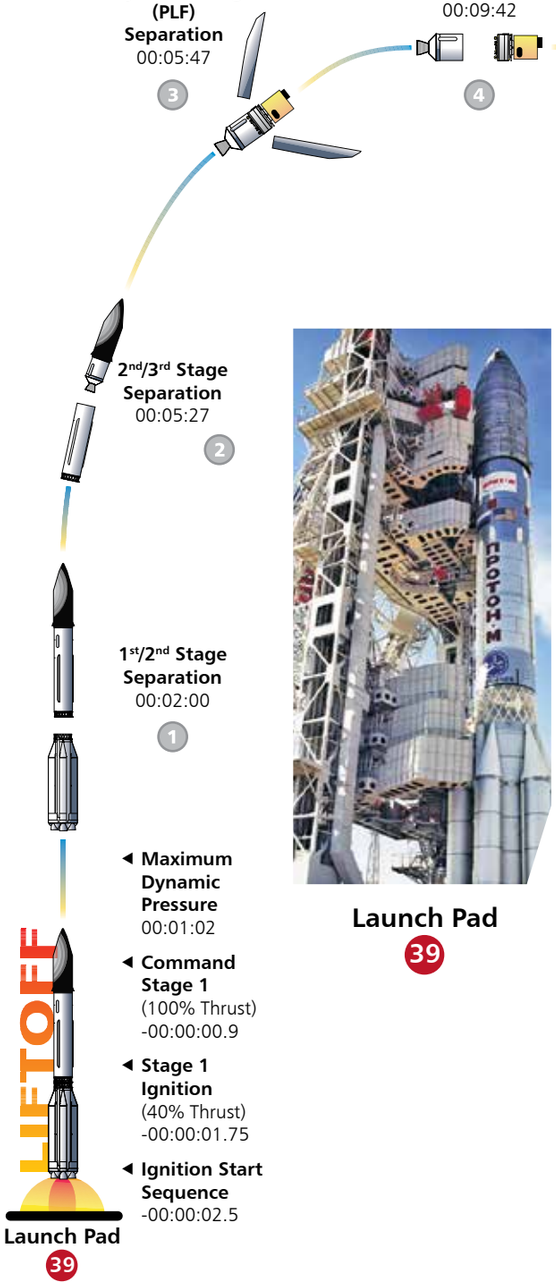
- **1st** ILS Proton Launch in 2015
- **88th** ILS Proton Launch Overall
- **3rd** Inmarsat Satellite Launched on ILS Proton
- **11th** Boeing Satellite Launched on ILS Proton

Inmarsat-5 F2

www.ilslaunch.com

Inmarsat-5 F2





Launch Pad
39

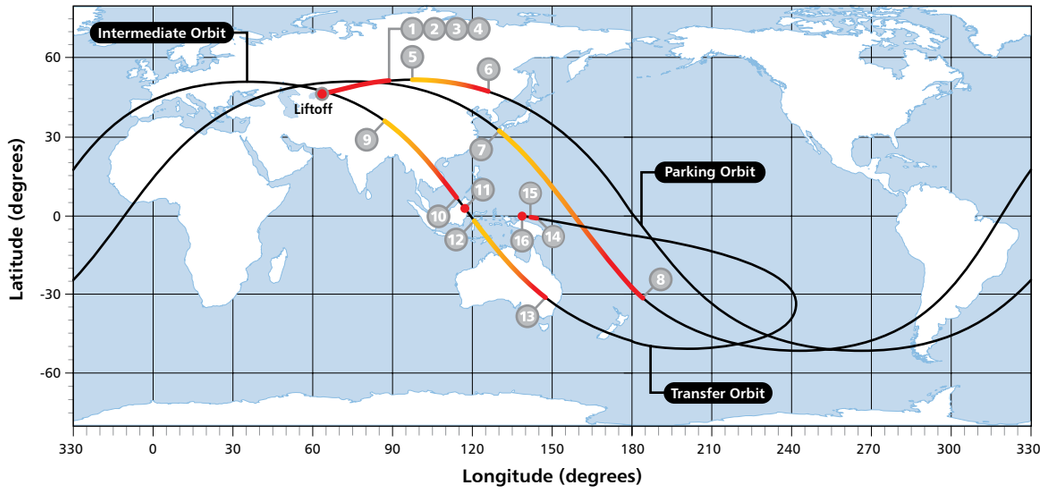
Ascent Profile

Mission Description

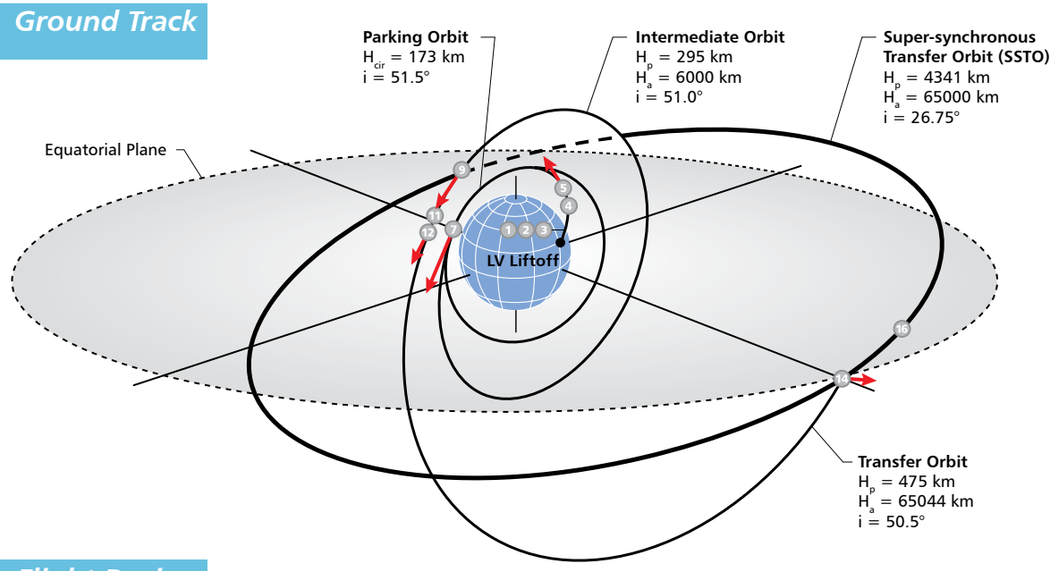
The Proton M launch vehicle, utilizing a 5-burn Breeze M Supersynchronous Transfer Orbit mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the Inmarsat-5 F2 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the Inmarsat-5 F1 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a supersynchronous transfer orbit. Separation of the Inmarsat-5 F2 satellite is scheduled to occur approximately 15 hours, 31 minutes after liftoff.

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002



Ground Track



Flight Design

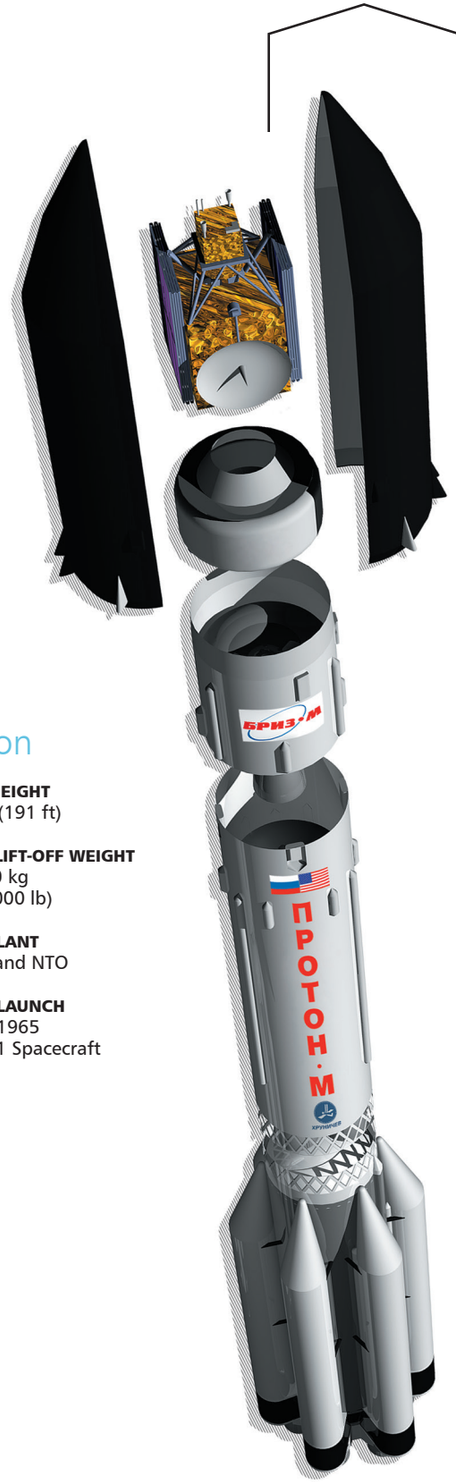
Proton

TOTAL HEIGHT
58.2 m (191 ft)

GROSS LIFT-OFF WEIGHT
705,000 kg
(1,554,000 lb)

PROPELLANT
UDMH and NTO

INITIAL LAUNCH
16 July 1965
Proton-1 Spacecraft



PAYLOAD FAIRINGS

There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

BREEZE M UPPER STAGE

The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxiliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

PROTON BOOSTER

The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

Satellite

SATELLITE OPERATOR
Inmarsat
www.inmarsat.com

SATELLITE MANUFACTURER
Boeing Satellite Systems
www.Boeing.com

PLATFORM
BSS-702HP

SEPARATED MASS
6070 kg

SATELLITE MISSION LIFETIME
15 Years

SATELLITE MISSION

Inmarsat Global Xpress (GX) will be the first globally available high-speed broadband network. It will be delivered over three Inmarsat-5 satellites and will offer the unique combination of global coverage from a single operator and the network reliability for which Inmarsat is renowned. Based on Ka-band technology, GX will consistently deliver higher performance through more compact terminals at a lower cost than existing VSAT services, making it accessible to many more users.

Mission Overview

- **3rd** ILS Proton Launch in 2015
- **90th** ILS Proton Launch Overall
- **5th** Inmarsat Satellite Launched on Proton
- **19th** Boeing Satellite Launched on Proton

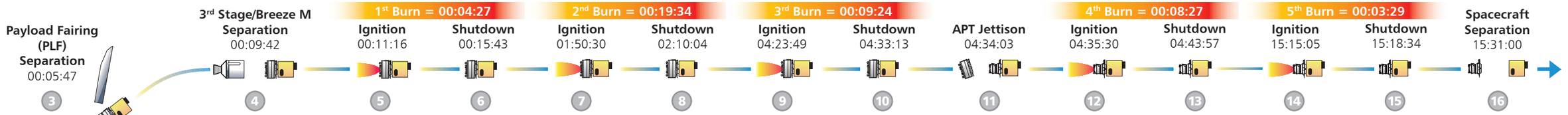
Inmarsat-5 F3

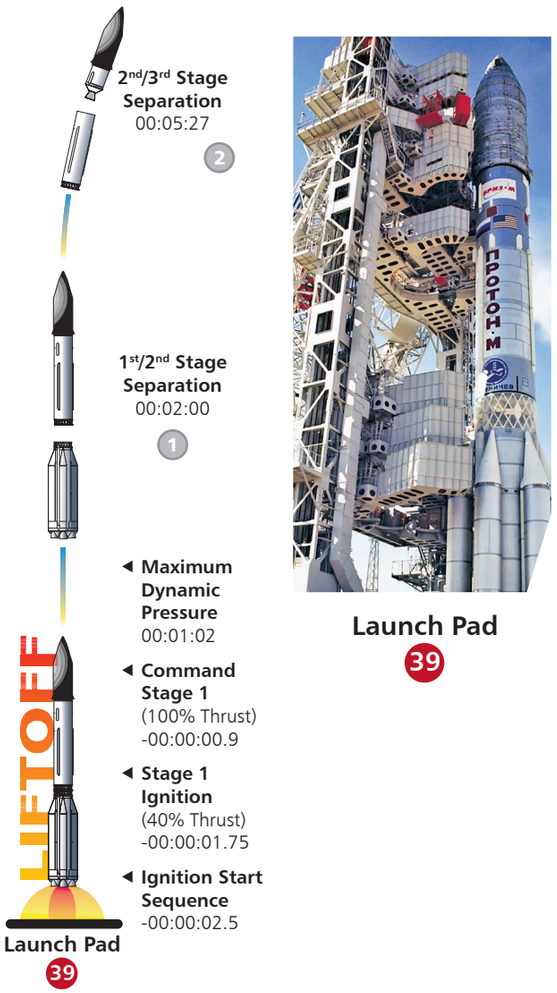
ILS

KHRUNICHEV STATE RESEARCH AND PRODUCTION SPACE CENTER

www.ilslaunch.com

Inmarsat-5 F3





Launch Pad
39

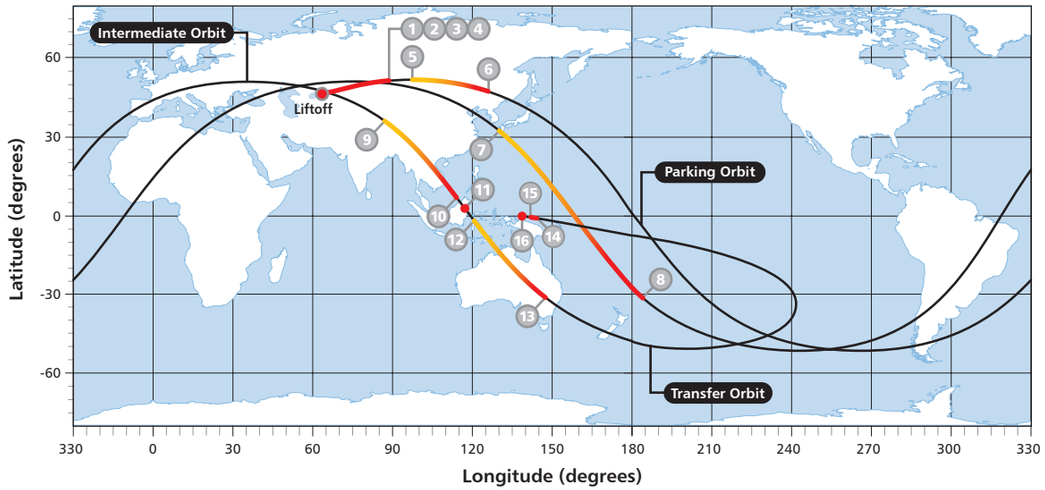
Ascent Profile

Mission Description

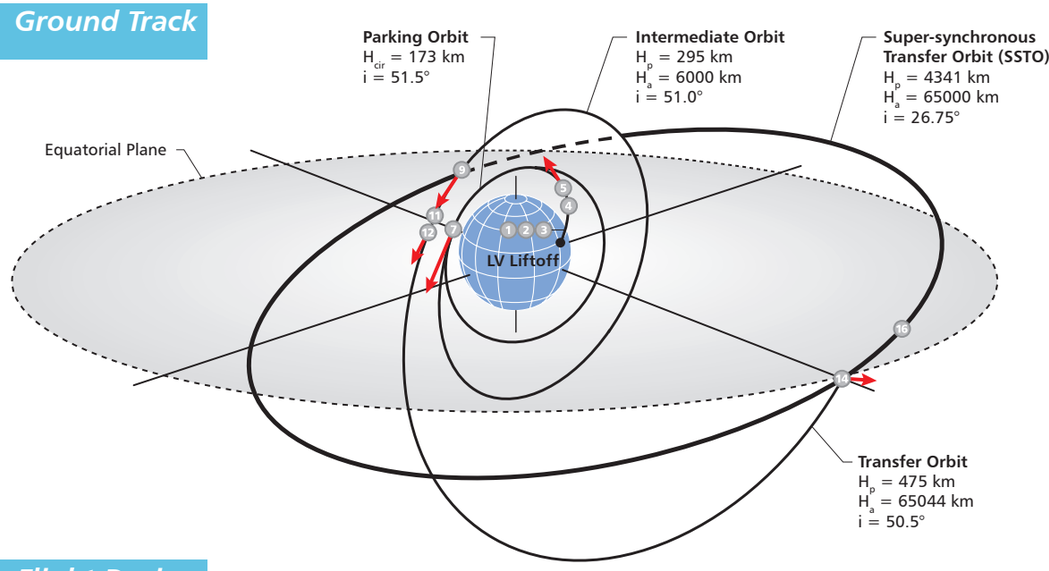
The Proton M launch vehicle, utilizing a 5-burn Breeze M Supersynchronous Transfer Orbit mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the Inmarsat-5 F3 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the Inmarsat-5 F3 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a supersynchronous transfer orbit. Separation of the Inmarsat-5 F3 satellite is scheduled to occur approximately 15 hours, 31 minutes after liftoff.

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M / Breeze M launch — 30 December 2002
- 400th Proton launch — 15 December 2014
- 50th year in service in 2015



Ground Track



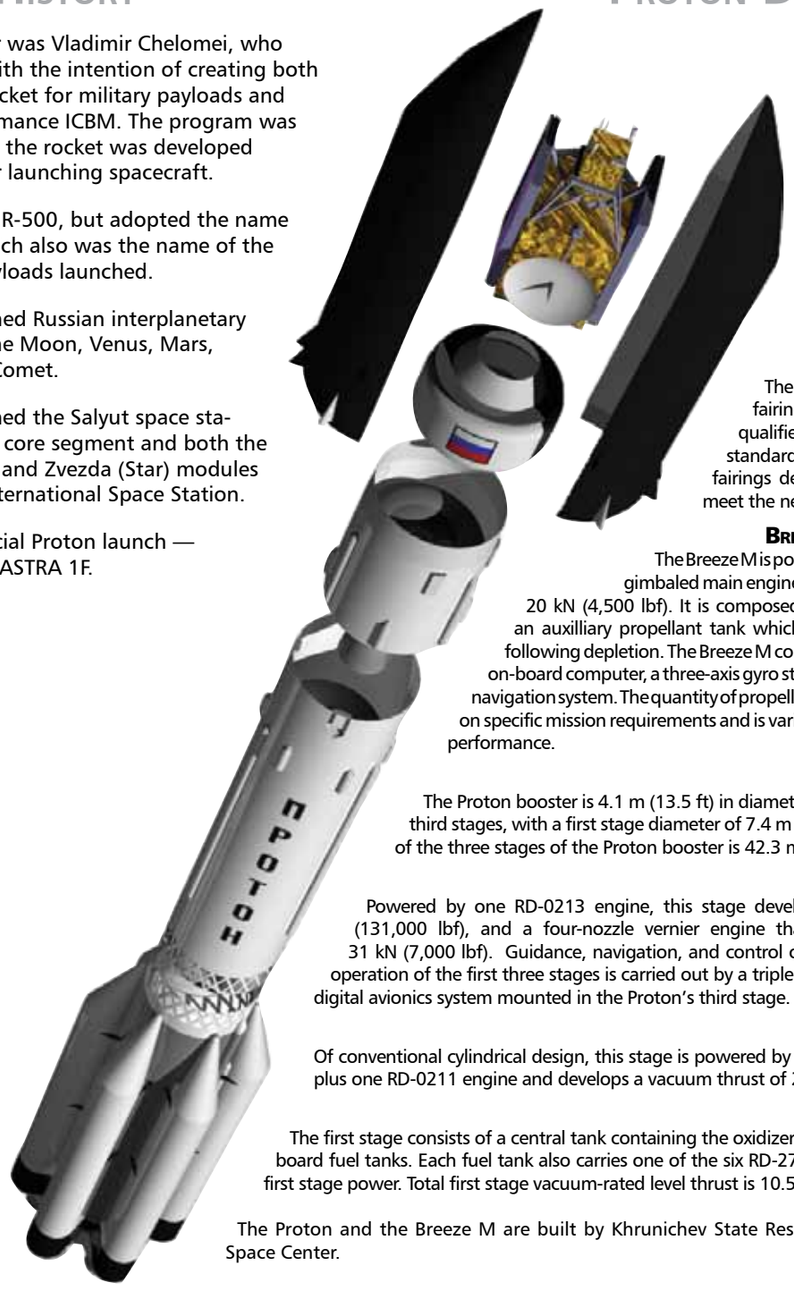
Flight Design

THE VEHICLE

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996, ASTRA 1F.

Proton Description



Total Height
56.2 m (184 ft)

Gross Liftoff Weight
691,000 kg
(1,523,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-275 engines that provide first stage power. Total first stage vacuum-rated level thrust is 10.5 MN (2,360,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE SATELLITE

Satellite Operator
Intelsat
www.intelsat.com

Satellite Manufacturer
Orbital Sciences Corporation
www.orbital.com

Platform
Star 2.4

Separated Mass
2056.6 kg

Satellite Design Life
16 Years

Satellite Mission
The Intelsat 16 satellite (IS-16) will be located at 58 degrees West Longitude. The high-power Ku-band payload will provide expansion capacity for SKY Mexico offering High Definition (HD) services and delivering news, sports and entertainment programming to its direct-to-home viewers. In addition, IS-16 will be available to provide backup capacity for SKY Brazil.

ILS
www.ilslaunch.com

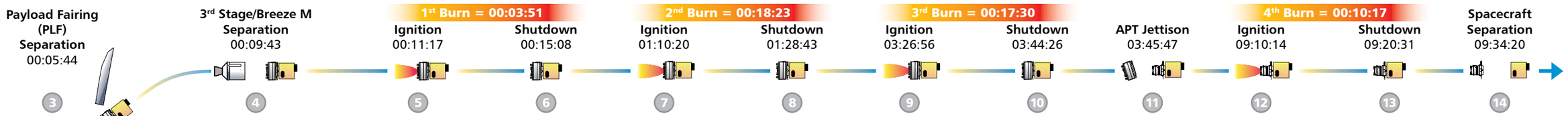
Intelsat 16

Mission Overview

- **1st** ILS Proton Launch in 2010
- **57th** Proton Launch for ILS
- **2nd** Orbital Satellite Launched on Proton
- **3rd** Intelsat Satellite Launched with ILS

KHRUNICHEV STATE RESEARCH AND PRODUCTION SPACE CENTER

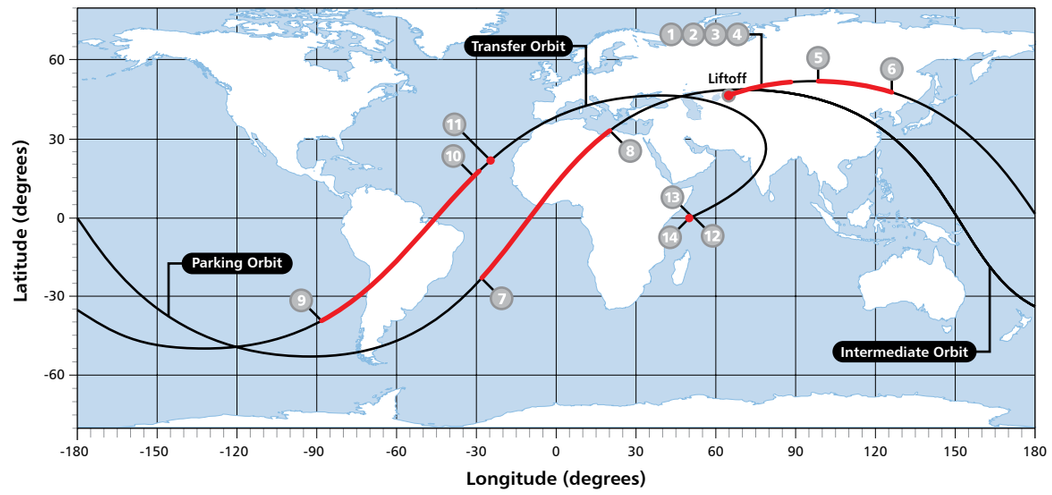
THE **MISSION**

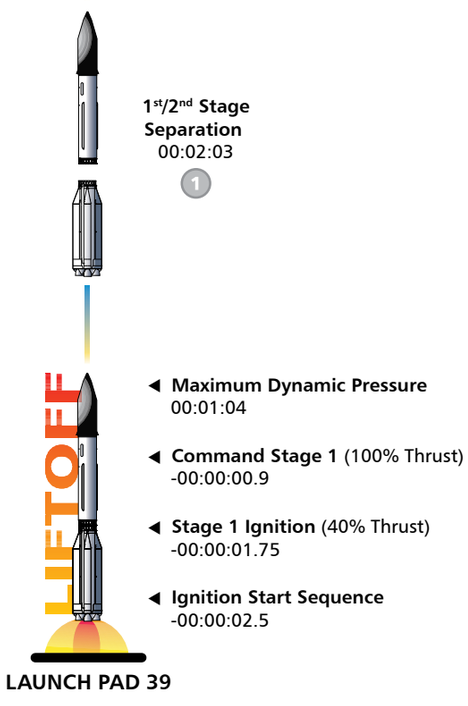


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 4-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the Intelsat 16 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the Intelsat 16 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a near geostationary orbit. Separation of the Intelsat 16 satellite is scheduled to occur approximately 9 hours, 34 minutes after liftoff.

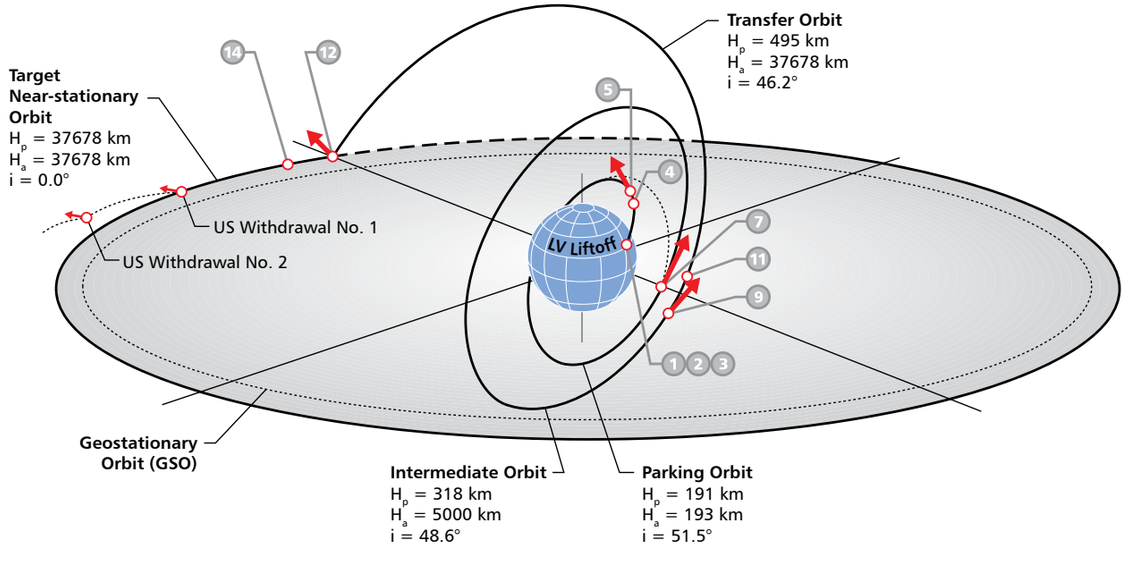
GROUND TRACK





ASCENT PROFILE

PROTON ON PAD 39

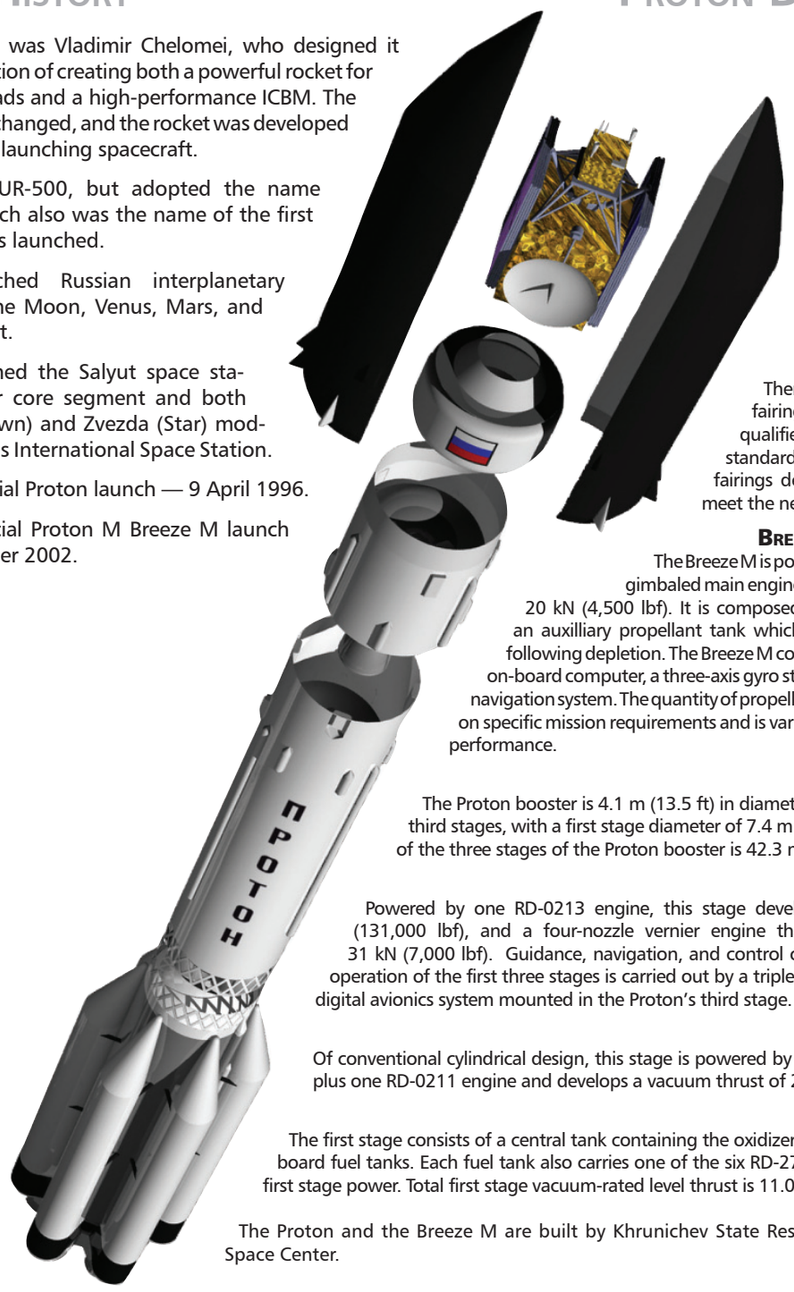


ORBIT INSERTION

THE **VEHICLE**

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002.



Proton Description

Total Height
58.2 m (191 ft)

Gross Lift-off Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE **SATELLITE**

Satellite Operator
Inmarsat Plc
www.inmarsat.com

Satellite Manufacturer
Boeing Satellite Systems
www.Boeing.com

Platform (Bus)
BSS-702HP

Separated Mass
6100 kg

Satellite Mission Lifetime
15 Years

Mission
Inmarsat Global Xpress will be the first globally available high-speed broadband network. It will be delivered over three Inmarsat-5 satellites and will offer the unique combination of global coverage from a single operator, consistent higher performance of up to 50 Mbps, and the network reliability for which Inmarsat is renowned. Based on Ka-band technology, GX will consistently deliver higher performance through more compact terminals at a lower cost than existing VSAT services, making it accessible to many more users.

Mission Overview

ILS

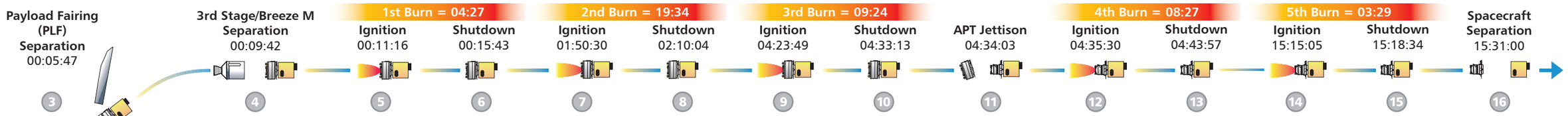
Experience ILS: Achieve Your Mission
QUALITY | PERFORMANCE | EXPERIENCE | DEDICATION

www.ilslaunch.com

Inmarsat-5 F1

- **7th** ILS Proton Launch in 2013
- **84th** ILS Proton Launch Overall
- **3rd** Inmarsat Satellite Launched on Proton
- **16th** Boeing Satellite Launched on ILS Proton

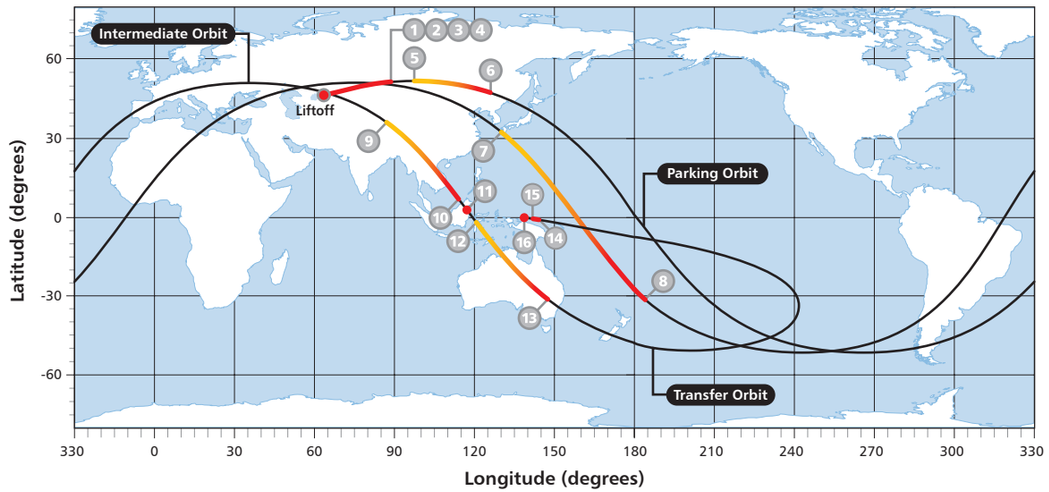
THE **MISSION**

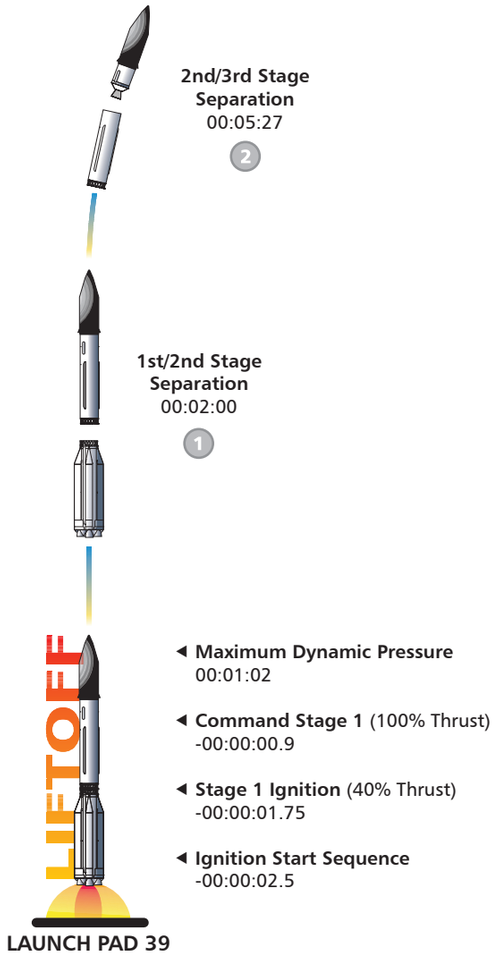


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M Supersynchronous Transfer Orbit mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the Inmarsat-5 F1 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the Inmarsat-5 F1 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a supersynchronous transfer orbit. Separation of the Inmarsat-5 F1 satellite is scheduled to occur approximately 15 hours, 31 minutes after liftoff.

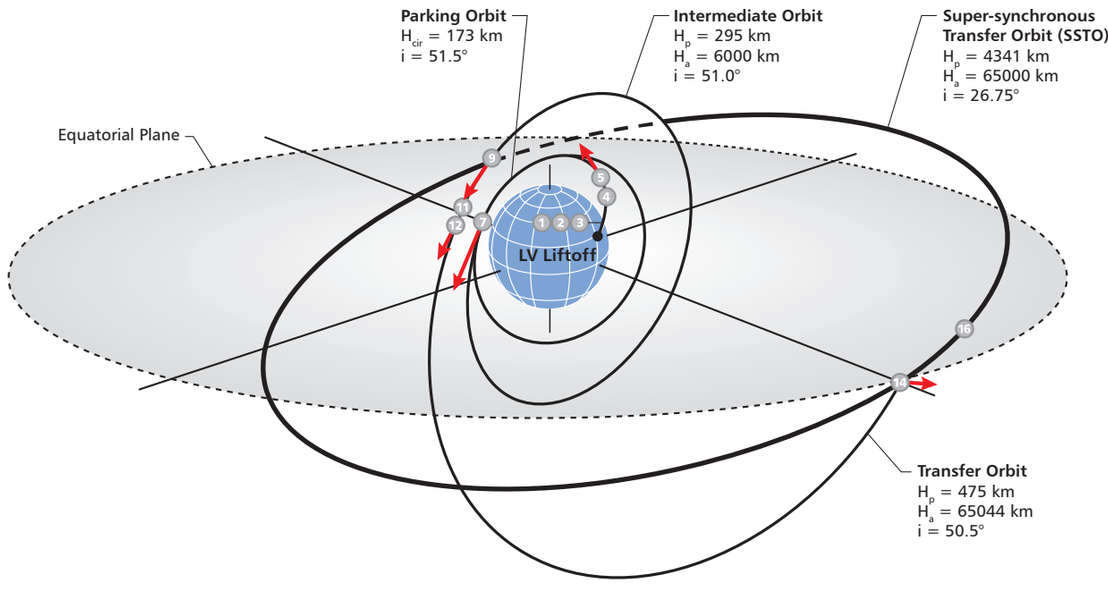
GROUND TRACK



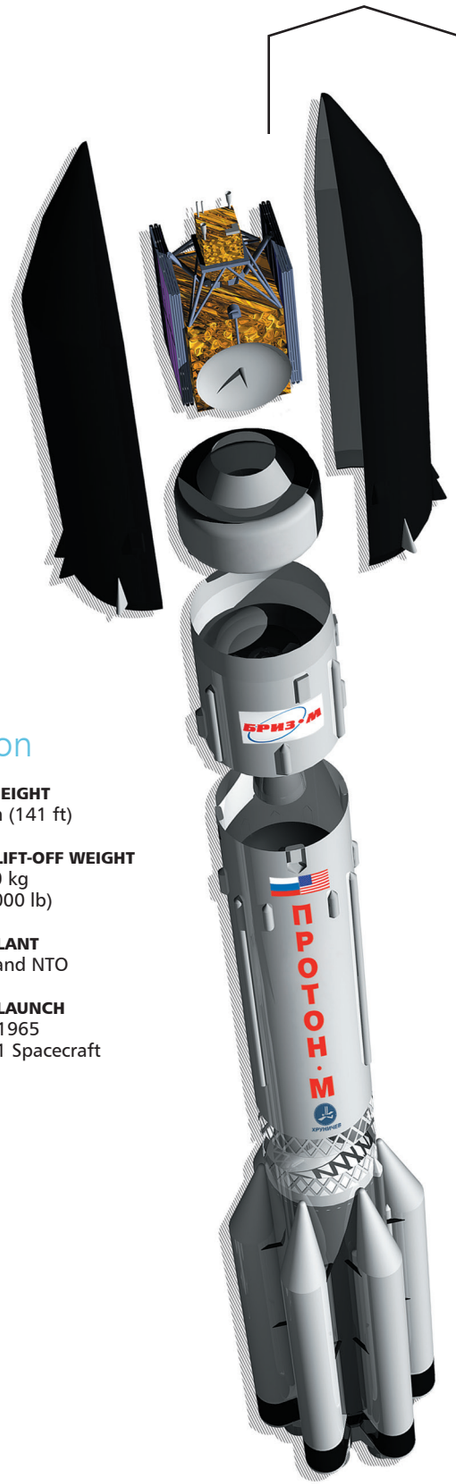


ASCENT PROFILE

PROTON ON PAD 39



FLIGHT DESIGN



Proton

TOTAL HEIGHT
42.95 m (141 ft)

GROSS LIFT-OFF WEIGHT
705,000 kg
(1,554,000 lb)

PROPELLANT
UDMH and NTO

INITIAL LAUNCH
16 July 1965
Proton-1 Spacecraft

PAYLOAD FAIRINGS

This mission will utilize the standard PLF-BR-15255 commercial payload fairing which is 4.1 meters in diameter and 15.255 meters in length. The PLF encapsulates the Intelsat 31 satellite along with the Breeze M upper stage to provide protection from the dense atmosphere for the first 5 minutes and 46 seconds after launch.

BREEZE M UPPER STAGE

The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxiliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

PROTON BOOSTER

The Proton booster consists of three stages (described below). The overall height of the three stages of Proton is 42.3 meters (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

Satellite

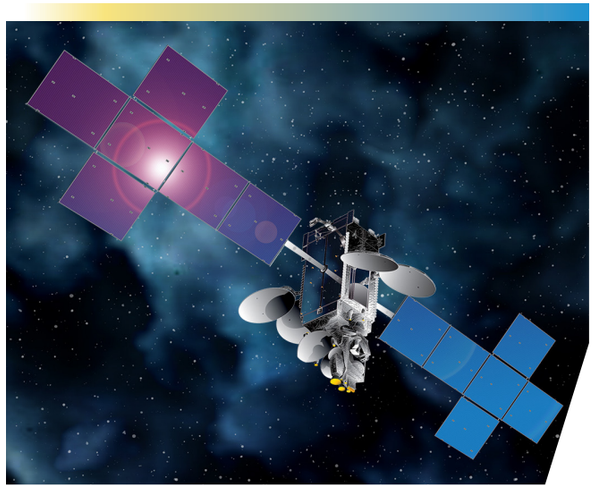
SATELLITE OPERATOR
Intelsat
www.intelsat.com

SATELLITE MANUFACTURER
SSL
www.sslmda.com

PLATFORM
SSL 1300

SEPARATED MASS
6450 kg

SATELLITE DESIGN LIFETIME
> 15 Years



SATELLITE MISSION

Intelsat 31 hosting the DLA-2 payload is a flexible, powerful satellite built by SSL for Intelsat. It will be co-located with Intelsat 30/DLA-1 at 95 degrees West longitude where it will augment and provide redundancy and reliability for broadcast services in Latin America. The 20-kilowatt satellite will be used by DIRECTV Latin America for high definition programming in nine different countries.

Mission Overview

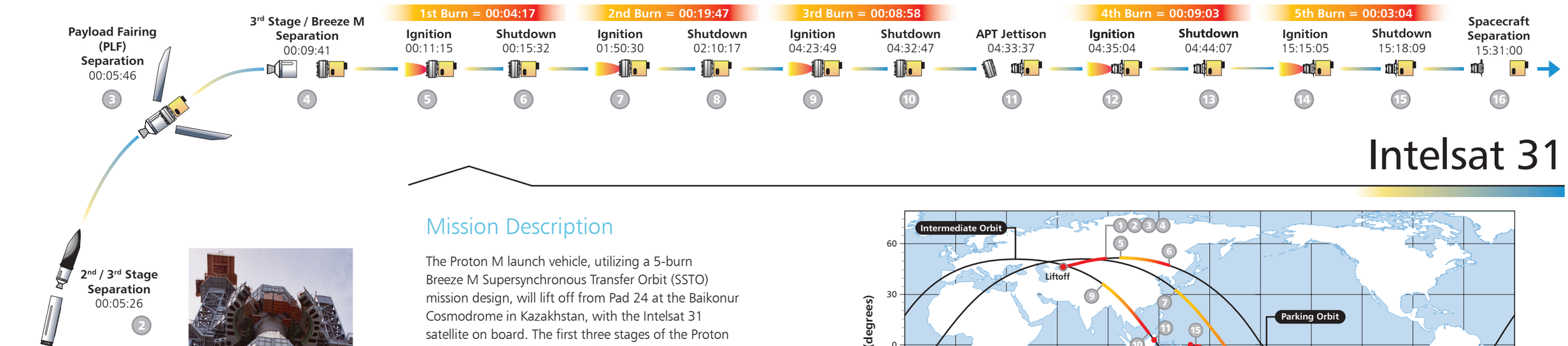
- **2nd** ILS Proton Launch in 2016
- **93rd** ILS Proton Launch Overall
- **12th** Intelsat Satellite Launched on ILS Proton
- **28th** SSL Satellite Launched on ILS Proton

Intelsat 31

ILS

KHRUNICHEV STATE RESEARCH AND PRODUCTION SPACE CENTER

www.ilslaunch.com



Launch Pad
24

Ascent Profile

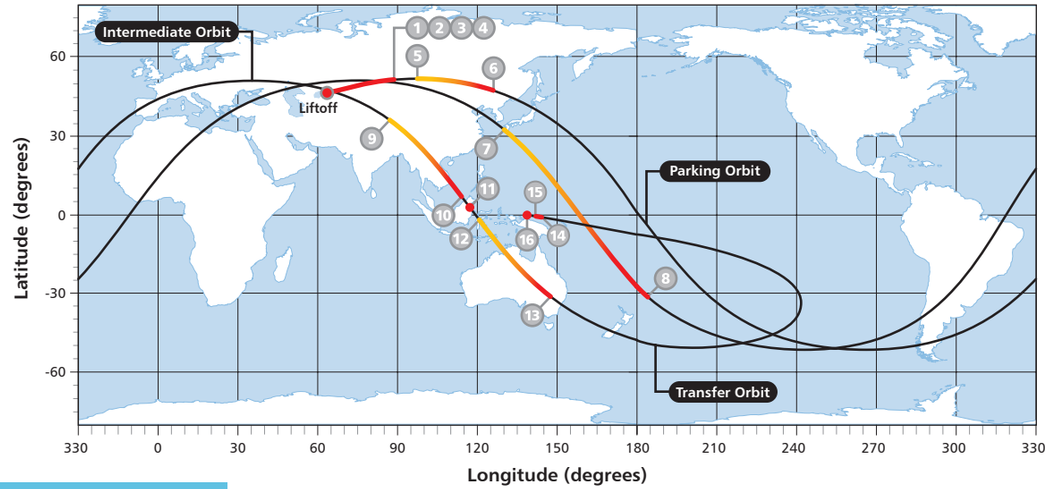
Intelsat 31

Mission Description

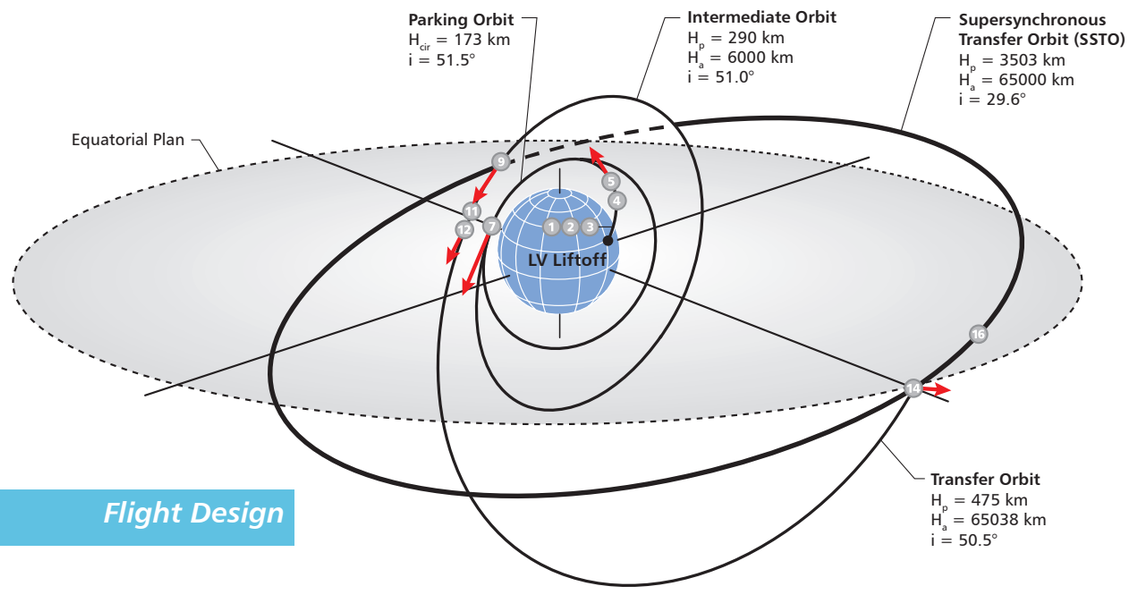
The Proton M launch vehicle, utilizing a 5-burn Breeze M Supersynchronous Transfer Orbit (SSTO) mission design, will lift off from Pad 24 at the Baikonur Cosmodrome in Kazakhstan, with the Intelsat 31 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the Intelsat 31 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a supersynchronous transfer orbit. Separation of the Intelsat 31 satellite is scheduled to occur approximately 15 hours, 31 minutes after lift-off.

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name “Proton”, which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley’s Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today’s International Space Station.
- First commercial Proton launch — 9 April 1996
- First commercial Proton M/Breeze M launch — 30 December 2002
- 400th Proton launch — 15 December 2014
- 50th year in service in 2015
- KhSC 100 year anniversary — 30 April 2016



Ground Track



Flight Design

THE **VEHICLE**

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
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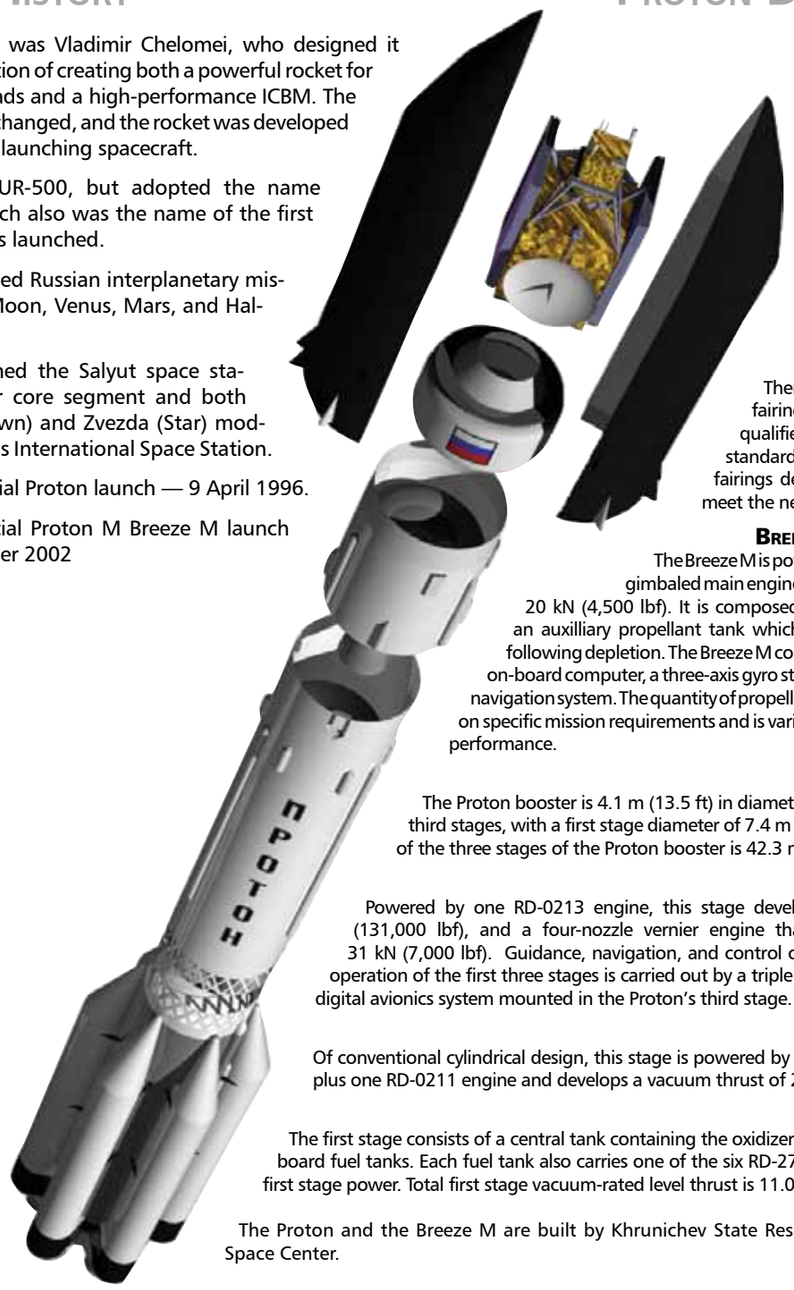
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002



Proton Description

Total Height
58.2 m (191 ft)

Gross Liftoff Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

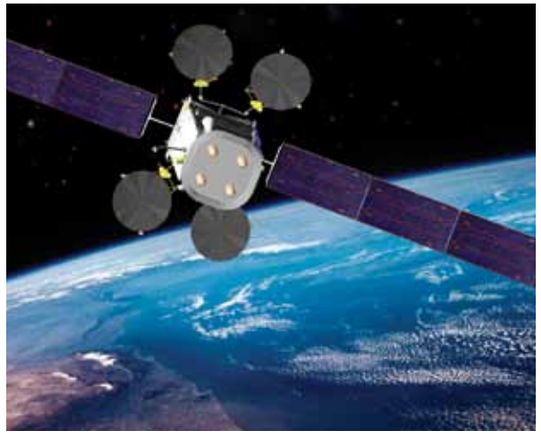
Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE **SATELLITE**



Satellite Operator
Intelsat
www.intelsat.com

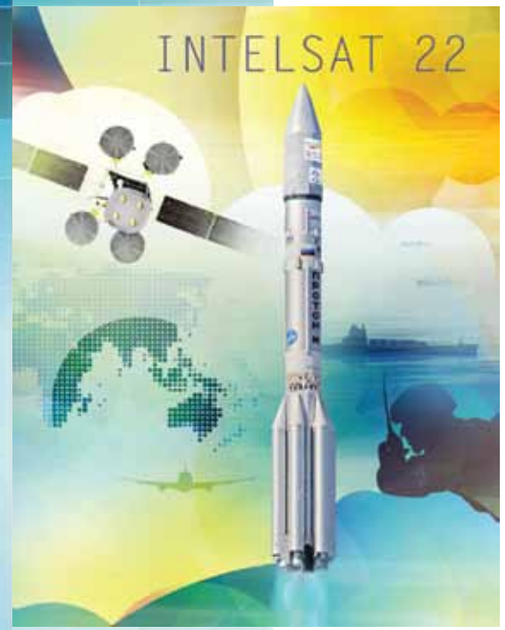
Satellite Manufacturer
Boeing Space & Intelligence Systems
www.boeing.com

Platform
702MP

Separated Mass
6249 kg

Satellite Mission Lifetime
15 Years

Satellite Mission
As part of Intelsat's 2012 fleet replacement and expansion plans, Intelsat 22 will provide critical C- and Ku-band capacity for customers in Europe, the Middle East, Africa and Asia from its position at 72° East. It also carries an Ultra-High Frequency hosted payload that will be used by the Australian Defence Force. The satellite is the first to utilize Boeing's new 702MP platform.



Mission Overview

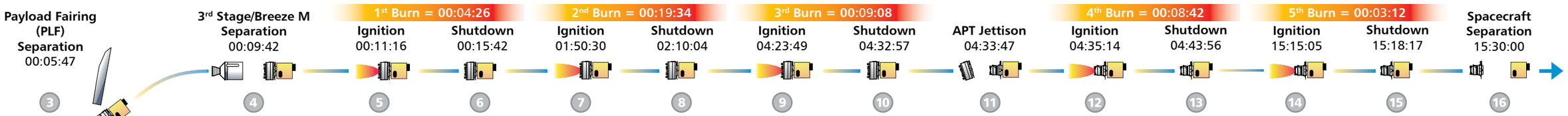
Experience ILS: Achieve Your Mission
QUALITY | PERFORMANCE | EXPERIENCE | DEDICATION

www.ilslaunch.com

Intelsat 22

- **4th** Intelsat Satellite Launched on ILS Proton
- **2nd** ILS Proton Launch in 2012
- **15th** Boeing Satellite Launched on ILS Proton
- **71st** ILS Proton Launch Overall

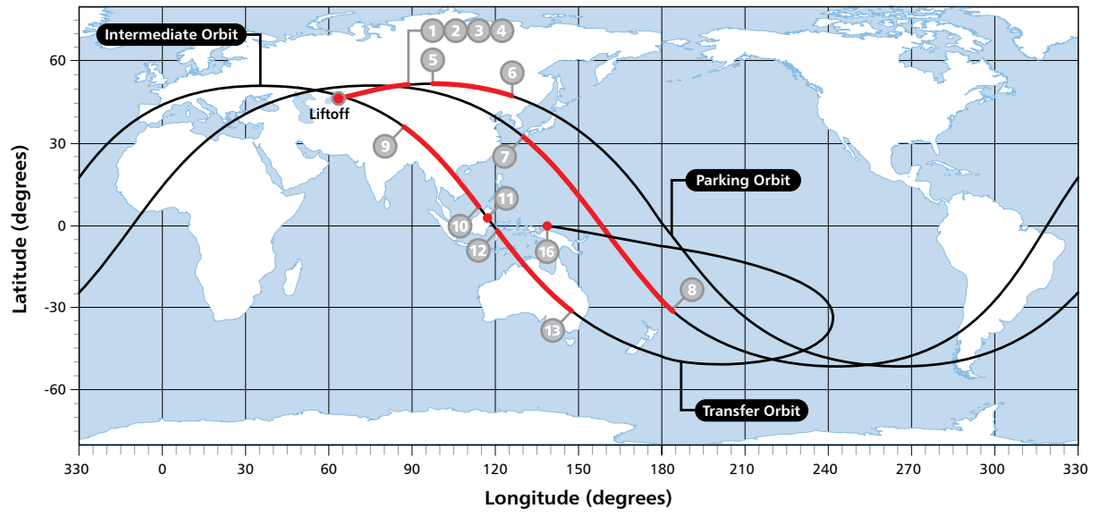
THE **MISSION**

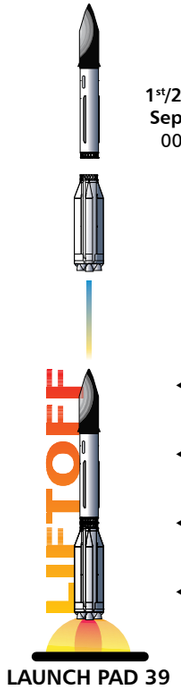


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M supersynchronous mission design, will lift-off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the Intelsat 22 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the Intelsat 22 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geostationary transfer orbit. Separation at 65,000 km apogee of the Intelsat 22 satellite is scheduled to occur approximately 15 hours, 30 minutes after lift-off.

GROUND TRACK

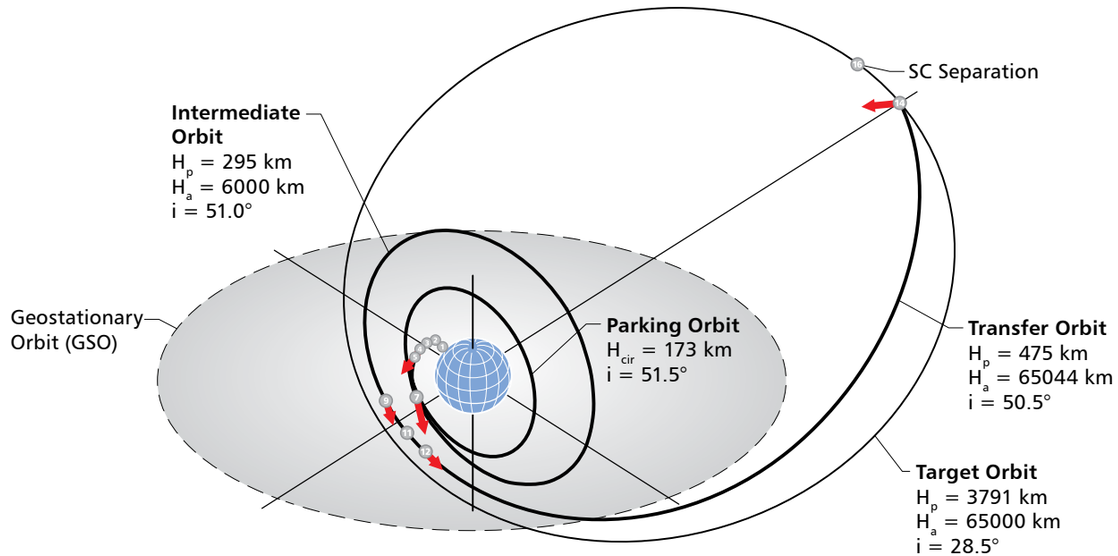




- **Maximum Dynamic Pressure** 00:01:02
- **Command Stage 1** (100% Thrust) -00:00:00.9
- **Stage 1 Ignition** (40% Thrust) -00:00:01.75
- **Ignition Start Sequence** -00:00:02.5

ASCENT PROFILE

PROTON ON PAD 39

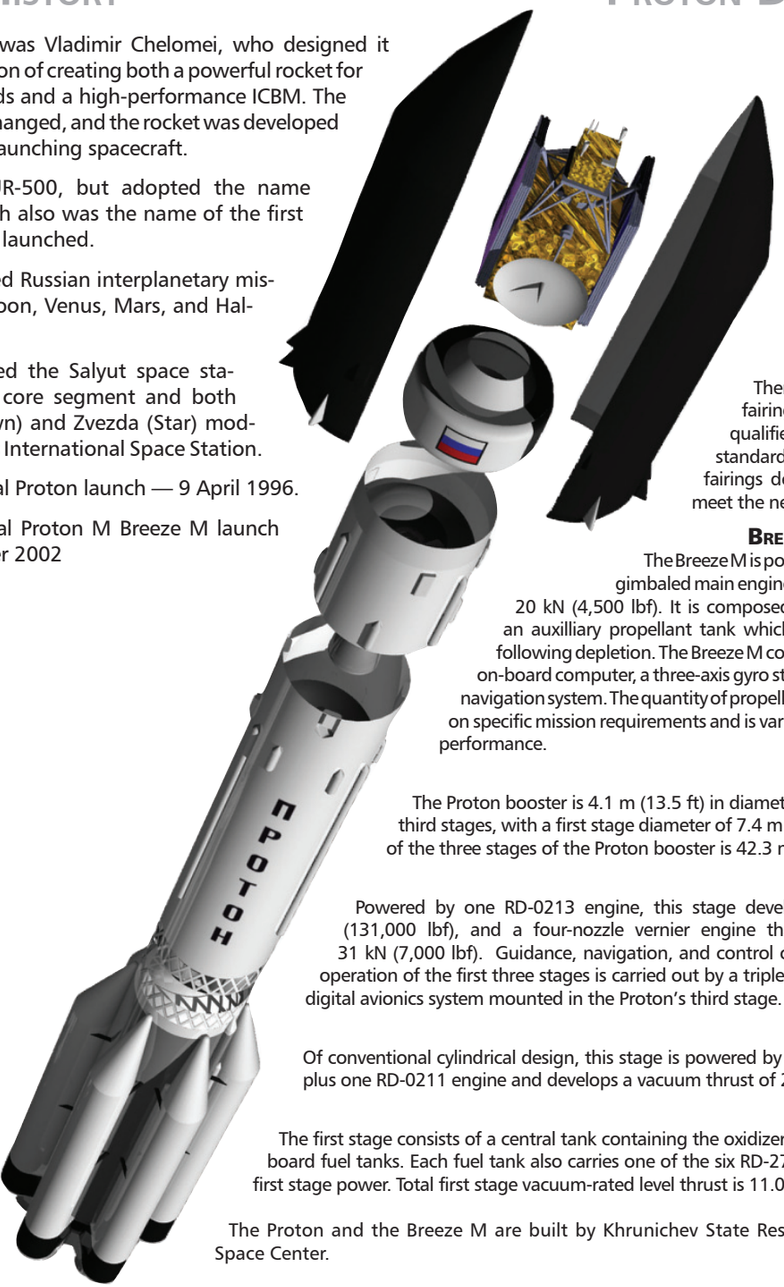


FLIGHT DESIGN

THE VEHICLE

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002



Proton Description

Total Height
56.2 m (184 ft)

Gross Liftoff Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

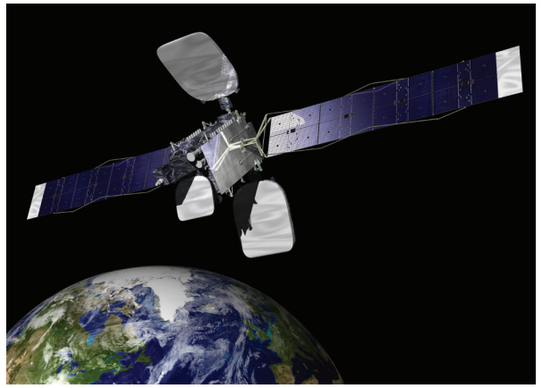
Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE SATELLITE



Satellite Operator
Intelsat
www.intelsat.com

Satellite Manufacturer
Orbital
www.orbital.com

Platform
GEOStar 2

Separated Mass
~2,700 kg

Satellite Mission Lifetime
15 Years

Satellite Mission
As part of Intelsat's fleet replacement and expansion plans, the Intelsat 23 (IS-23) satellite is scheduled to start service at 307° E longitude in 2012, and will replace the Intelsat 707 satellite. As a C-band and Ku-band satellite, Intelsat 23 will provide enhanced capacity for enterprise, oil and gas, and data networking services.

Mission Overview

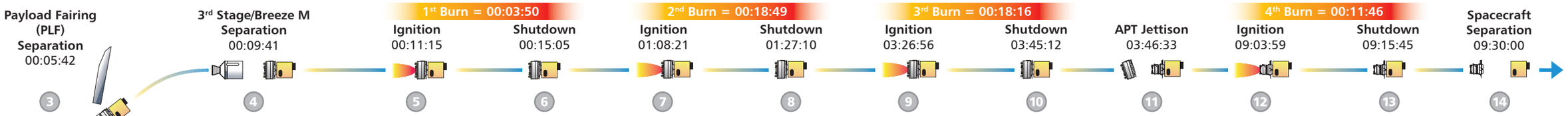
Experience ILS: Achieve Your Mission
QUALITY | PERFORMANCE | EXPERIENCE | DEDICATION

www.ilslaunch.com

Intelsat 23

- **6th** ILS Proton Launch in 2012
- **75th** ILS Proton Launch Overall
- **11th** Intelsat Satellite Launched on ILS Proton
- **5th** Orbital Satellite Launched on ILS Proton
- **4th** Geostationary Orbit Insertion Mission on an ILS Proton

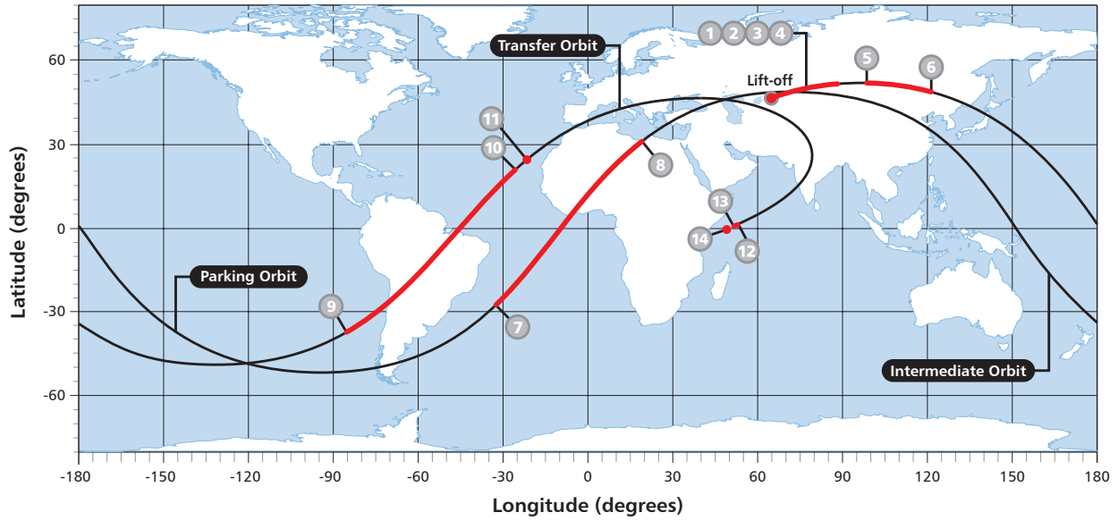
THE **MISSION**

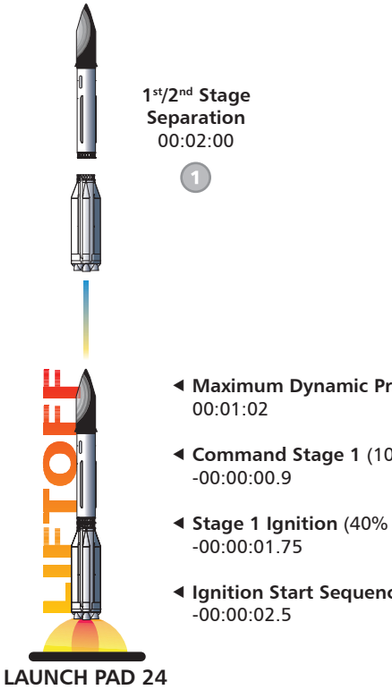


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 4-burn Breeze M mission design, will lift off from Pad 24 at Baikonur Cosmodrome, Kazakhstan, with the Intelsat 23 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the Orbital Unit (Breeze M Upper Stage and the Intelsat 23 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the Orbital Unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a near geostationary orbit. Separation of the Intelsat 23 satellite is scheduled to occur approximately 9 hours, 30 minutes after lift-off.

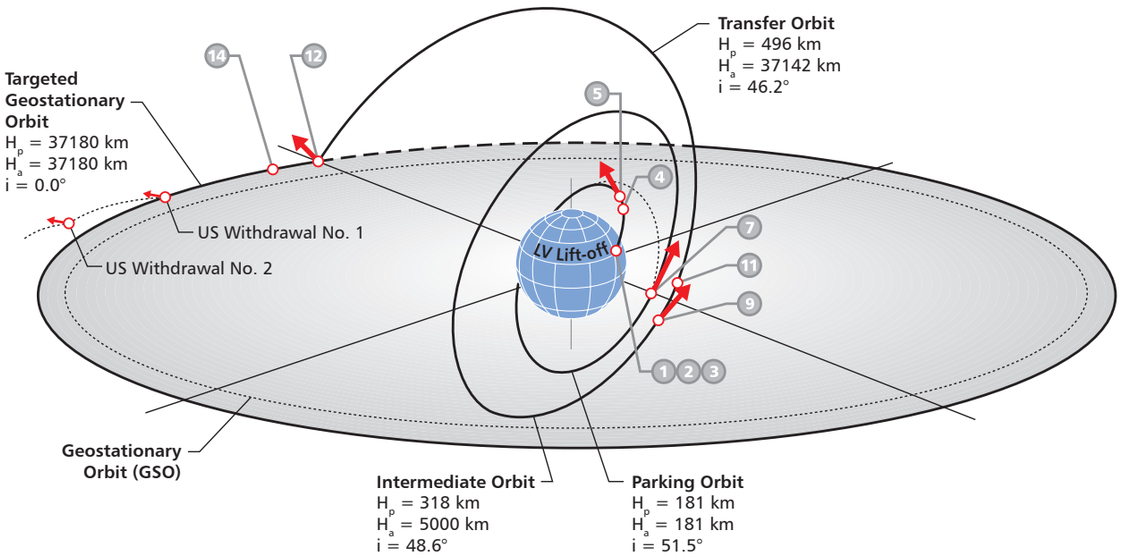
GROUND TRACK





ASCENT PROFILE

PROTON ON PAD 24

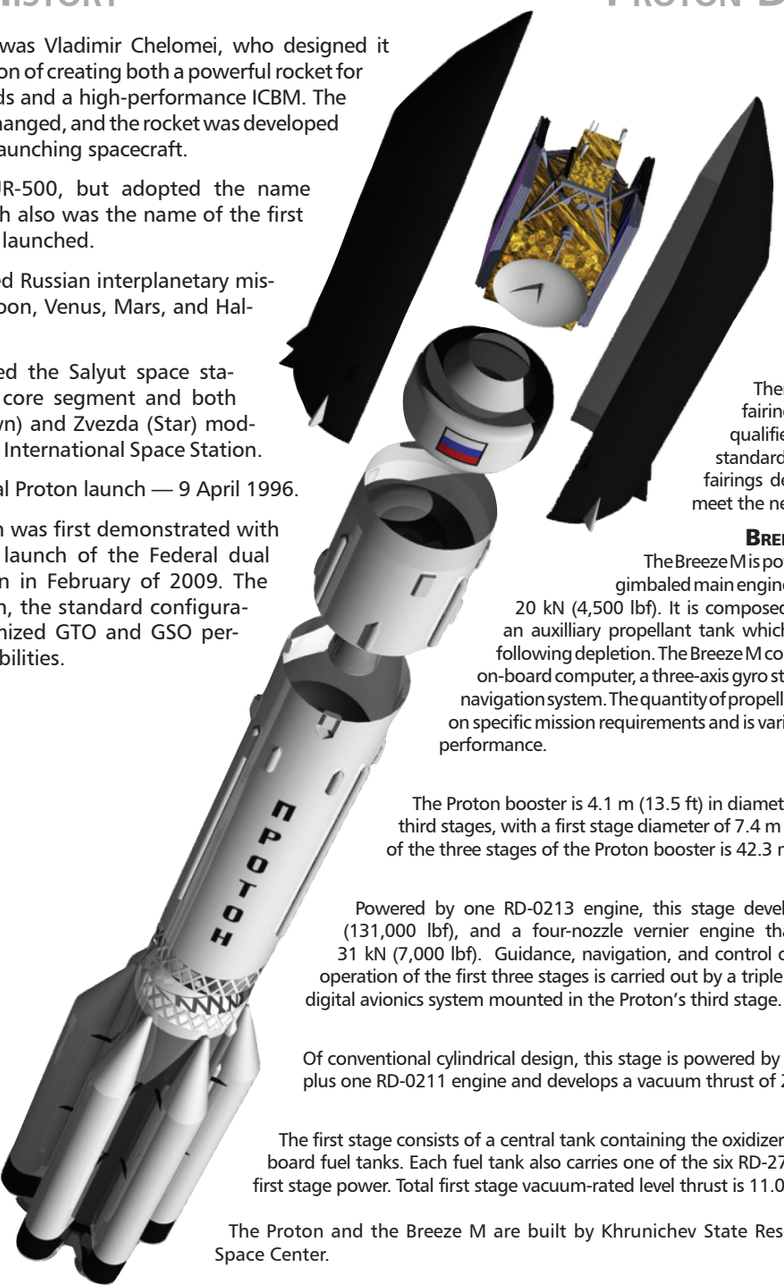


FLIGHT DESIGN

THE VEHICLE

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.
- Phase III Proton was first demonstrated with the successful launch of the Federal dual Express mission in February of 2009. The Phase III Proton, the standard configuration, has optimized GTO and GSO performance capabilities.



Proton Description

Total Height
58.2 m (191 ft)

Gross Liftoff Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

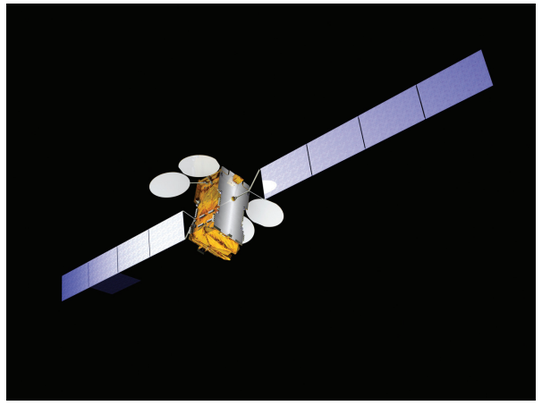
Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE SATELLITE



Satellite Operator
Eutelsat
www.eutelsat.com

Satellite Manufacturer
EADS Astrium
www.astrium.eads.net/

Platform
Eurostar E3000

Separated Mass
6150 kg

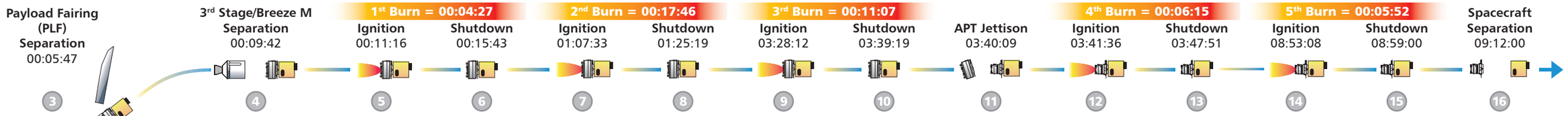
Satellite Design Life
15 Years

Satellite Mission
Eutelsat's KA-SAT is the first, in Europe, of a new generation of high throughput satellites optimized for consumer broadband services and targeting users located beyond range of high-speed terrestrial networks. Fully-operating in Ka-band frequencies and with total throughout of 70 Gigabits per second, the satellite will be located at Eutelsat's 9 degrees East position. Through a configuration of 82 spotbeams and a ground infrastructure of ten gateways connected to the Internet, service will be provided across Europe and the Mediterranean Basin. In addition to supporting expansion of Eutelsat's Tooway™ consumer broadband service, KA-SAT will open new resources for telecom operators, broadcasters and ISPs, for data and video services.

KA-SAT

- **12th** Proton Launch in 2010
- **8th** ILS Proton Launch in 2010
- **64th** ILS Proton Launch Overall
- **6th** Eutelsat Satellite Launched on Proton
- **13th** EuroStar Satellite Launched on ILS Proton

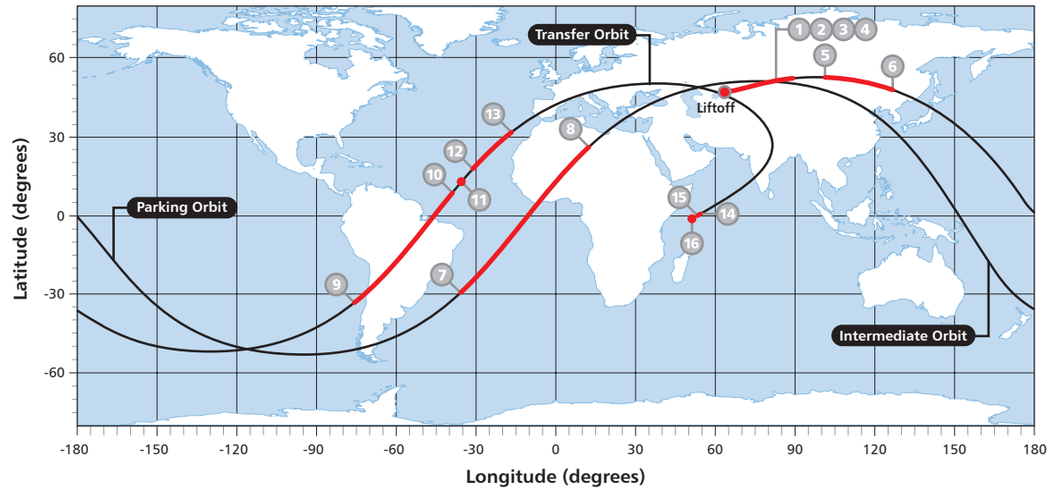
THE **MISSION**

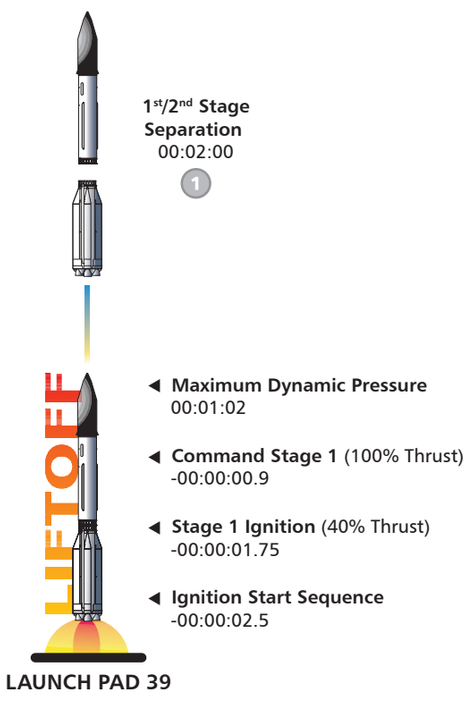


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the KA-SAT satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the KA-SAT satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geosynchronous transfer orbit. Separation of the KA-SAT satellite is scheduled to occur approximately 9 hours, 12 minutes after liftoff.

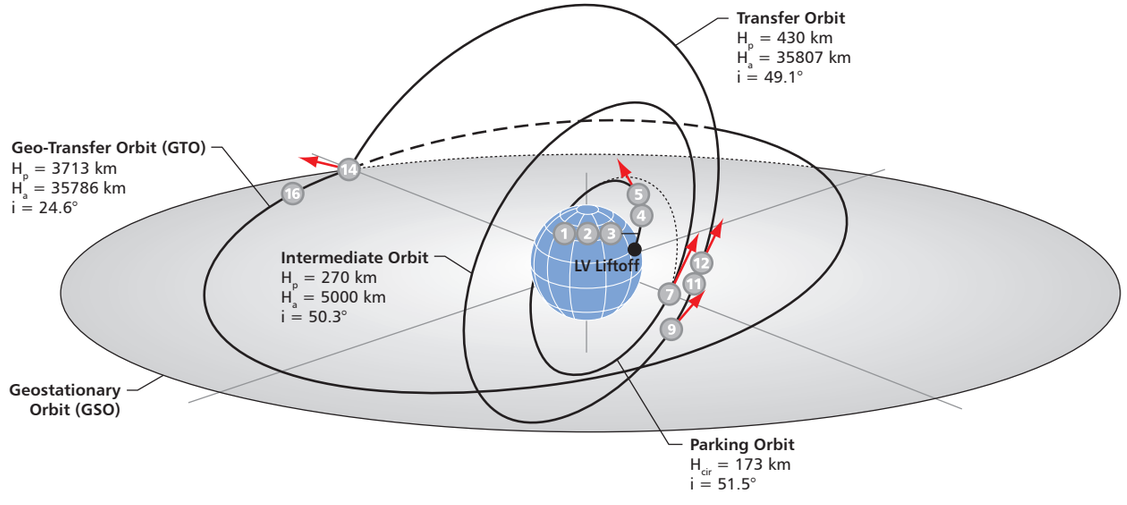
GROUND TRACK





ASCENT PROFILE

PROTON ON PAD 39

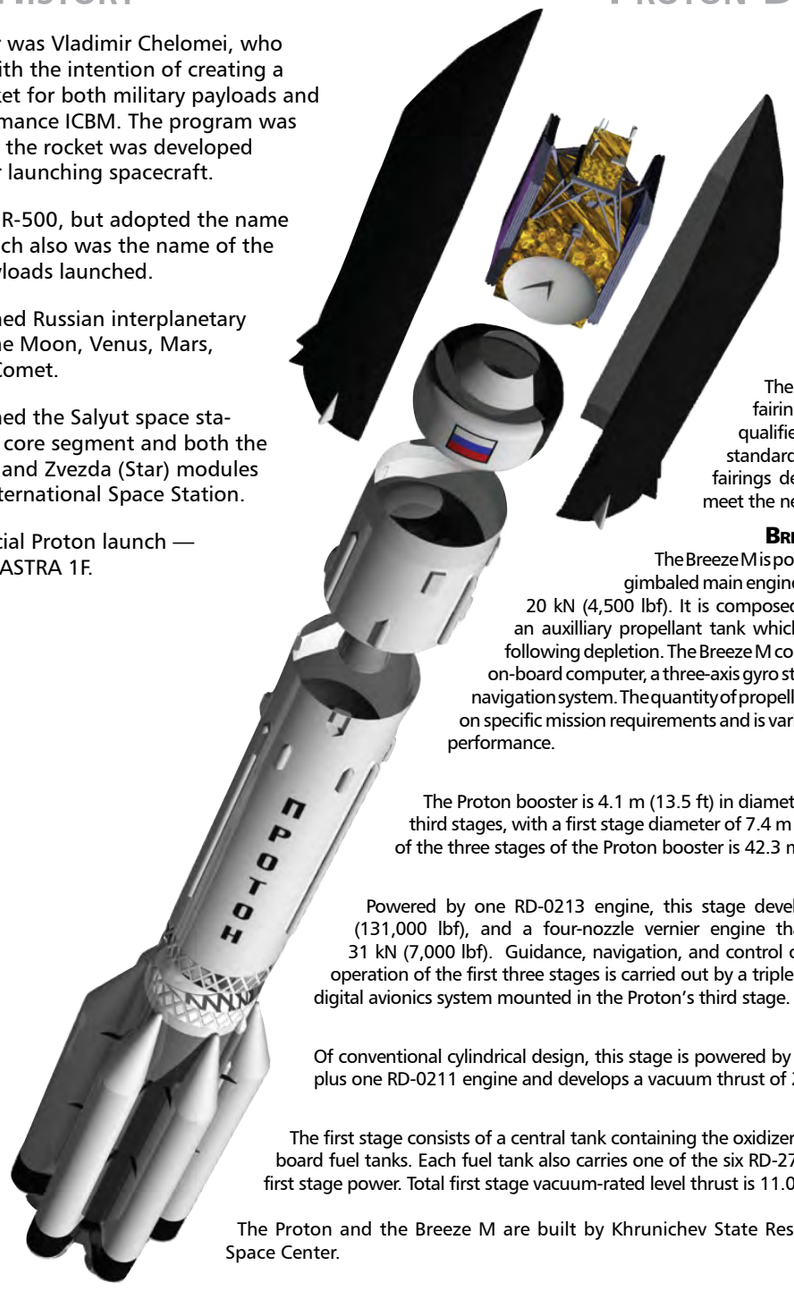


FLIGHT DESIGN

THE VEHICLE

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating a powerful rocket for both military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996, ASTRA 1F.



Proton Description

Total Height
56.2 m (184 ft)

Gross Liftoff Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and N_2O_4

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE SATELLITE

Satellite Operator
Telesat
www.telesat.com

Satellite Manufacturer
Space Systems/Loral
www.ssloral.com

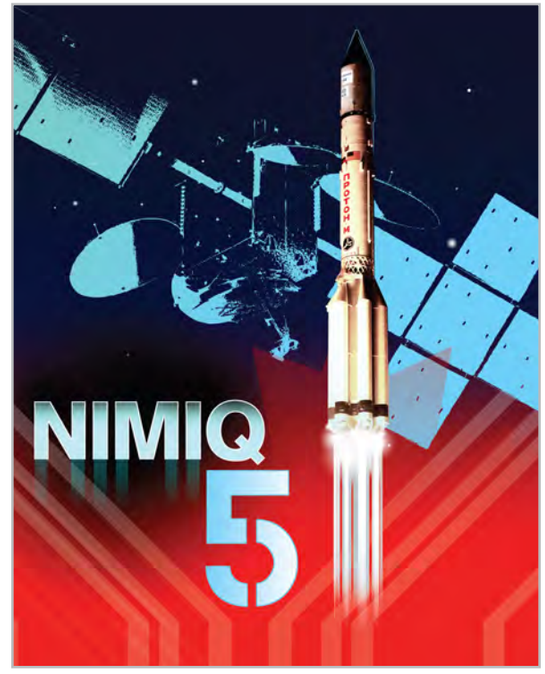
Platform
1300 Spacecraft Bus

Separated Mass
4745 kg

Satellite Design Life
15 Years

Satellite Mission
Nimiq 5 is a commercial communications satellite built by Space Systems/Loral. The satellite has a 32 transponder Ku-Band payload with capability to switch capacity between Canada and the Continental United States coverage areas. The satellite will be located at 72.7° West longitude. This satellite will be dedicated to the provision of direct-to-home services as part of Telesat's DTH fleet

ILS
www.ilslaunch.com



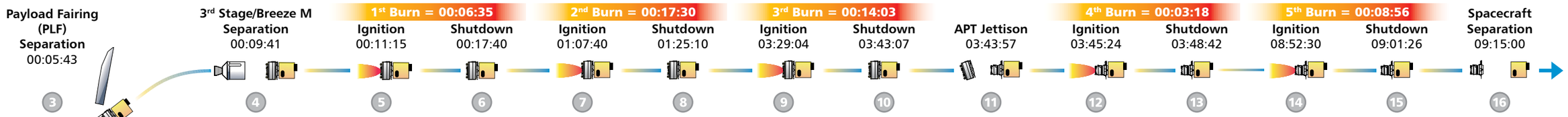
Nimiq 5

Mission Overview

- **7th** Proton Launch of 2009/ **5th** ILS Proton Launch of 2009
- **54th** Proton Launch for ILS
- **6th** Telesat satellite launch with ILS Proton
- **13th** Space Systems/Loral Satellite Launched on a Proton

KHRUNICHEV STATE RESEARCH AND PRODUCTION SPACE CENTER

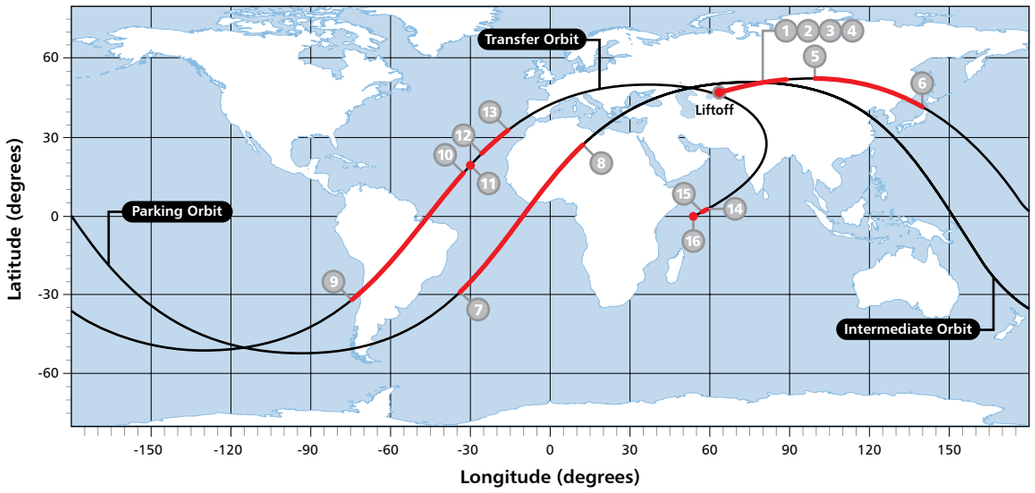
THE **MISSION**

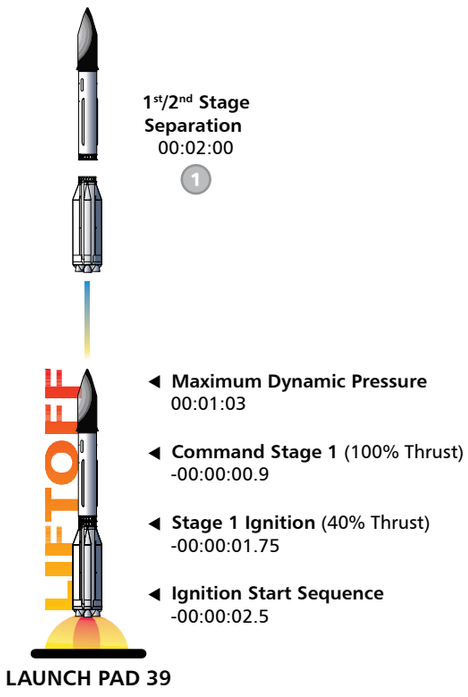


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the Nimiq 5 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the Ascent Unit (payload fairing, Breeze M upper stage and the Nimiq 5 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the Orbital Unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geo-transfer orbit. Separation of the Nimiq 5 satellite is scheduled to occur approximately 9 hours, 15 minutes after liftoff.

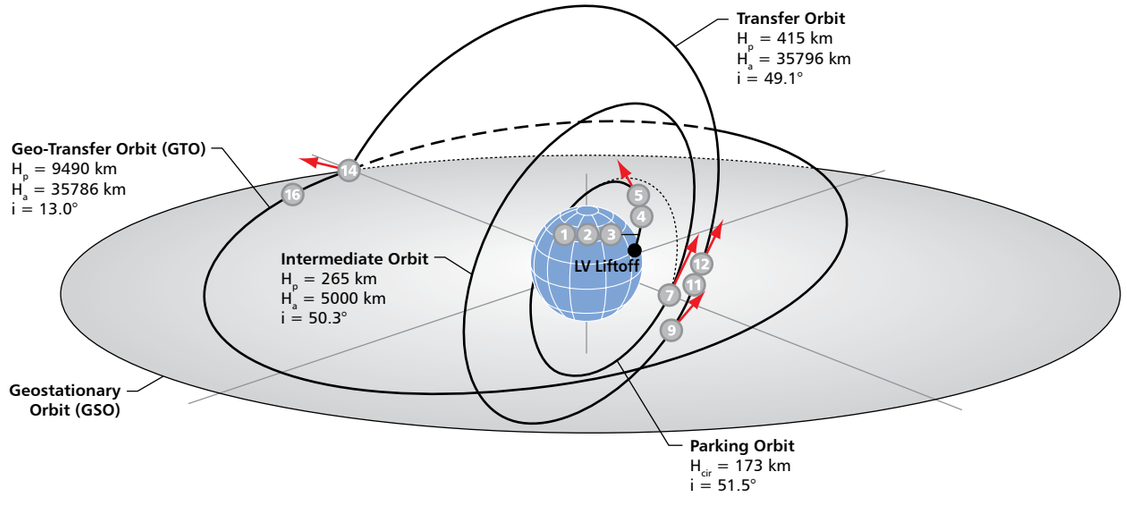
GROUND TRACK





ASCENT PROFILE

PROTON ON PAD 39



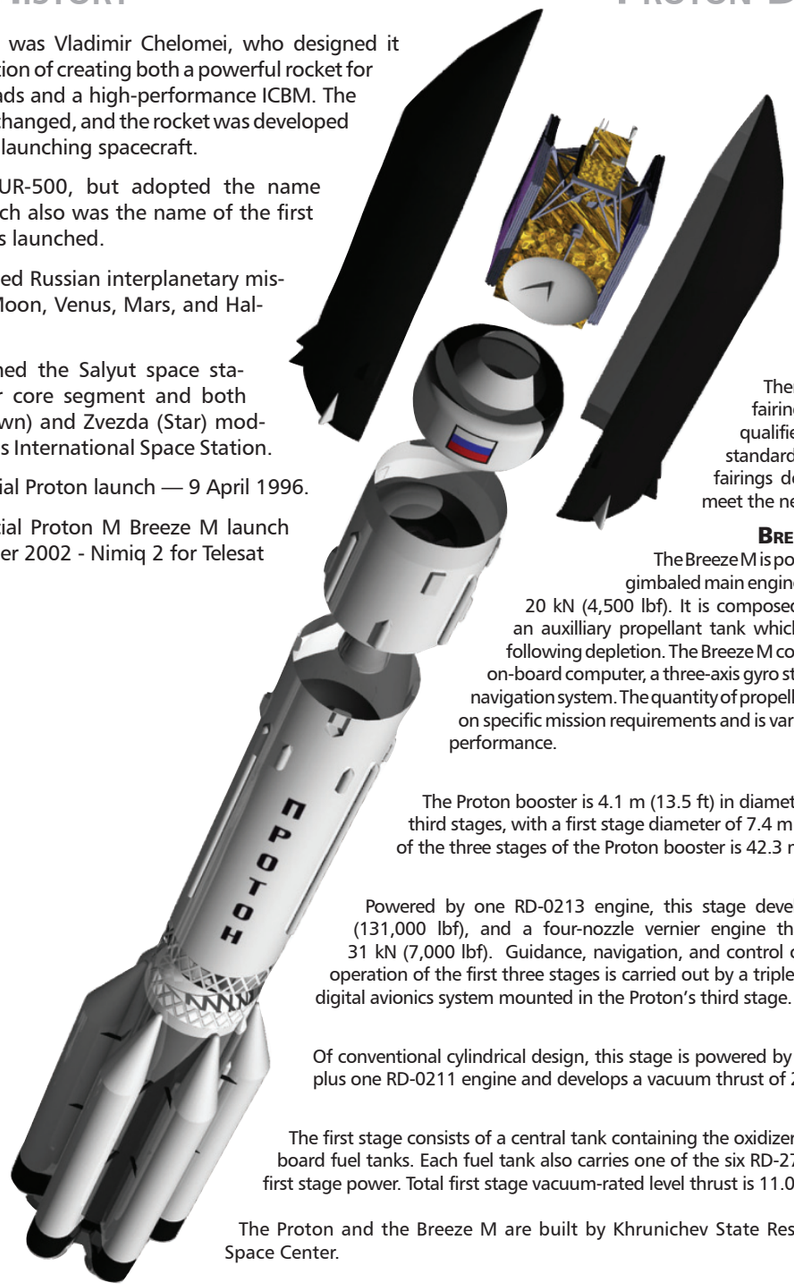
ORBIT INSERTION

THE VEHICLE

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002 - Nimiq 2 for Telesat

Proton Description



Total Height
56.2 m (184 ft)

Gross Liftoff Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE SATELLITE

Satellite Operator
Telesat
www.telesat.com

Satellite Manufacturer
Space Systems/Loral
www.ssloral.com

Platform
SS/L 1300

Separated Mass
~4500 kg

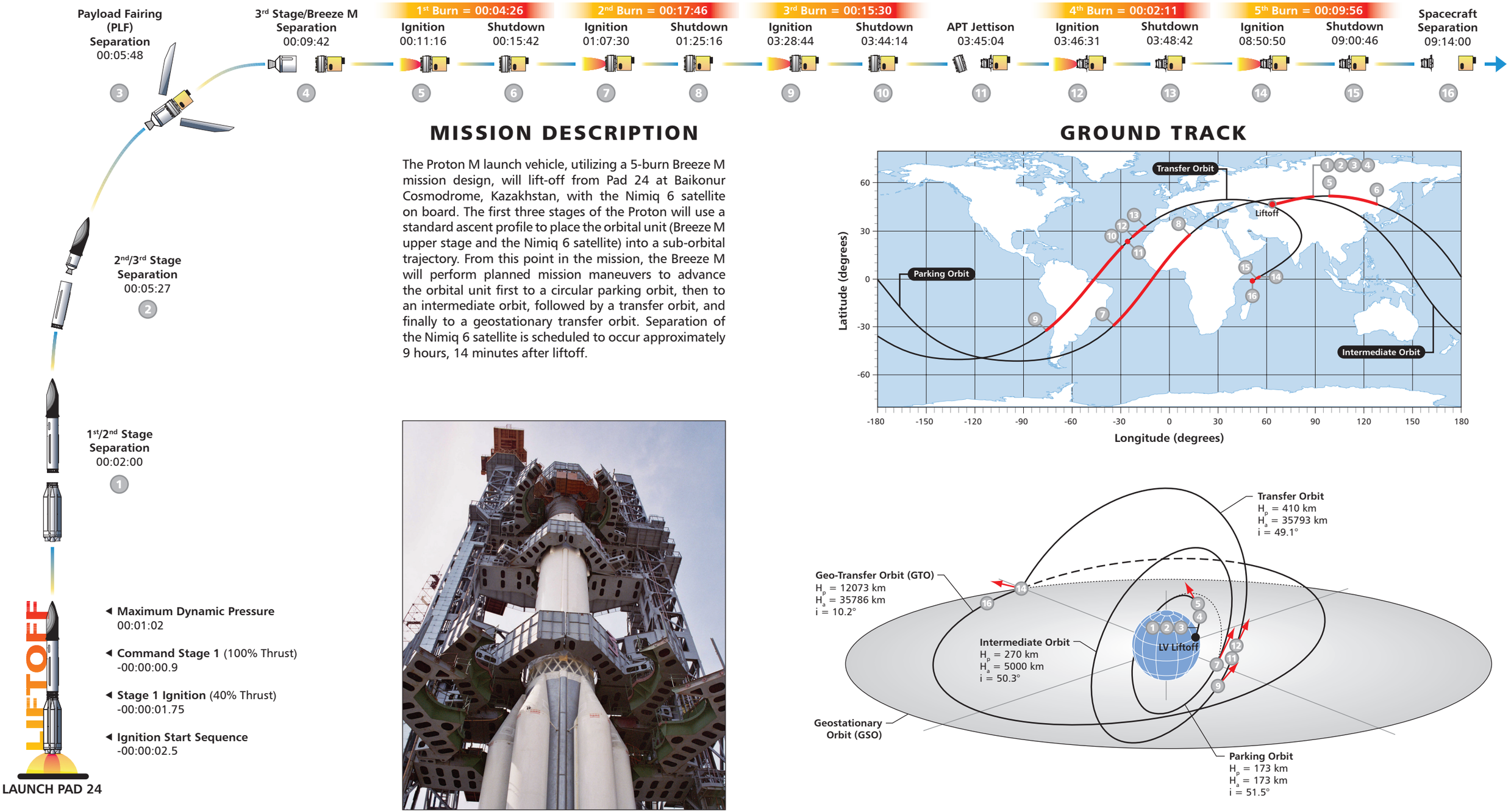
Satellite Mission Lifetime
15 Years

Satellite Mission
Nimiq 6 is a commercial communications satellite built by Space Systems/Loral. The satellite has a 32 transponder Ku-Band payload providing coverage of Canada. The satellite will be located at 91.1° West longitude. This satellite will be dedicated to the provision of direct-to-home services as part of Telesat's DTH fleet

Nimiq 6

- **8th** Telesat Satellite Launched on ILS Proton
- **4th** ILS Proton Launch in 2012
- **22nd** Space Systems/Loral Satellite Launched on ILS Proton
- **73rd** ILS Proton Launch Overall

THE **MISSION**



ASCENT PROFILE

MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift-off from Pad 24 at Baikonur Cosmodrome, Kazakhstan, with the Nimiq 6 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the Nimiq 6 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geostationary transfer orbit. Separation of the Nimiq 6 satellite is scheduled to occur approximately 9 hours, 14 minutes after liftoff.

PROTON ON PAD 24

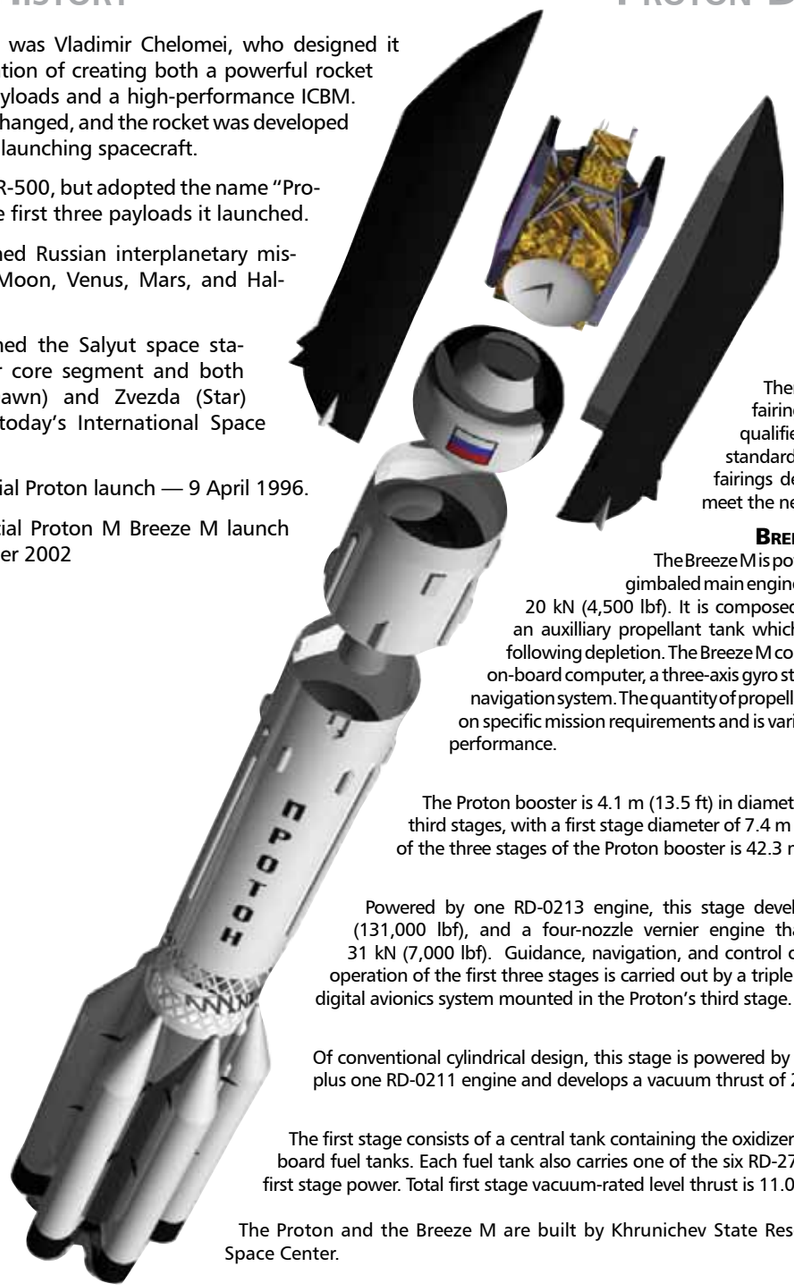
GROUND TRACK

FLIGHT DESIGN

THE **VEHICLE**

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," from the first three payloads it launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002



Proton Description

Total Height
58.2 m (191 ft)

Gross Liftoff Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE **SATELLITE**

Satellite Operator
SES
www.ses.com

Satellite Manufacturer
Space Systems/Loral
www.ssloral.com

Platform
SS/L 1300

Separated Mass
5,514 kg

Satellite Mission Lifetime
15 Years

Satellite Mission
QuetzSat-1, part of the 45+ satellite fleet of SES, will be located at the 77 degree west orbital location at which the Mexican Government has granted the DTH frequency rights to QuetzSat S. de R.L. de C.V., a Mexican-controlled company comprised of SES and Mexican investors. The spacecraft will provide coverage over Mexico, North America and Central America. The spacecraft is fully contracted to EchoStar Corporation and will be used in part by Dish Mexico, an EchoStar joint venture, for DTH services in Mexico and to a subsidiary of DISH Network for use in connection with its U.S. DTH business.

Mission Overview

ILS

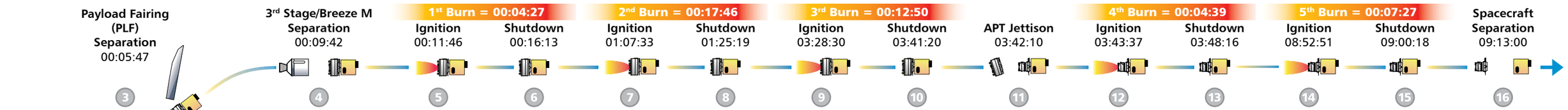
Experience ILS: Achieve Your Mission
QUALITY | PERFORMANCE | EXPERIENCE | DEDICATION

www.ilslaunch.com

QuetzSat-1

- **19th** SES Satellite Launch on ILS Proton
- **18th** Space Systems/Loral Satellite Launch on ILS Proton
- **3rd** ILS Proton Launch in 2011
- **67th** ILS Proton Launch Overall

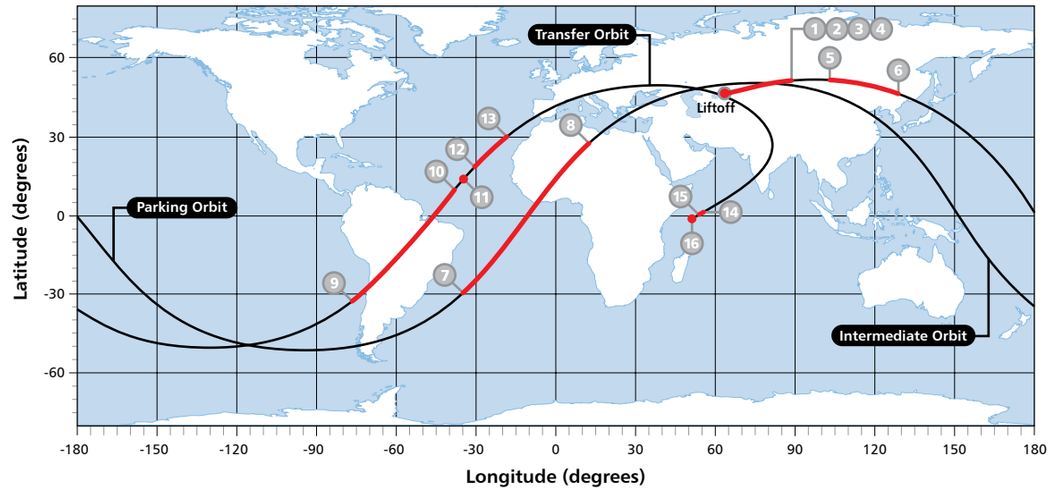
THE **MISSION**

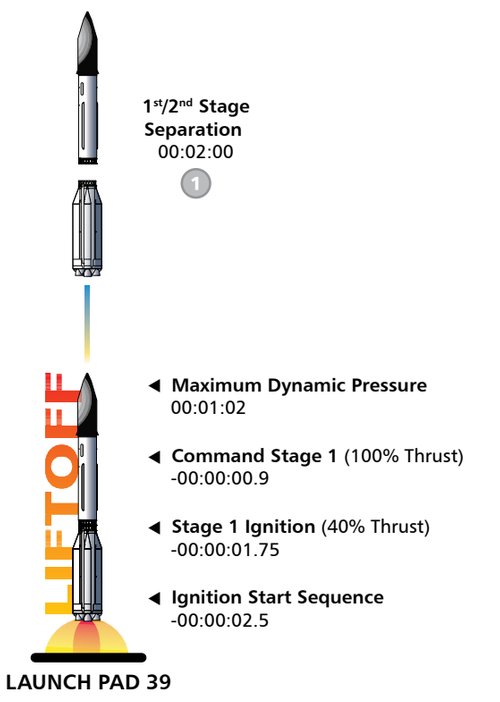


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the QuetzSat-1 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the QuetzSat-1 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geosynchronous transfer orbit. Separation of the QuetzSat-1 satellite is scheduled to occur approximately 9 hours, 13 minutes after liftoff.

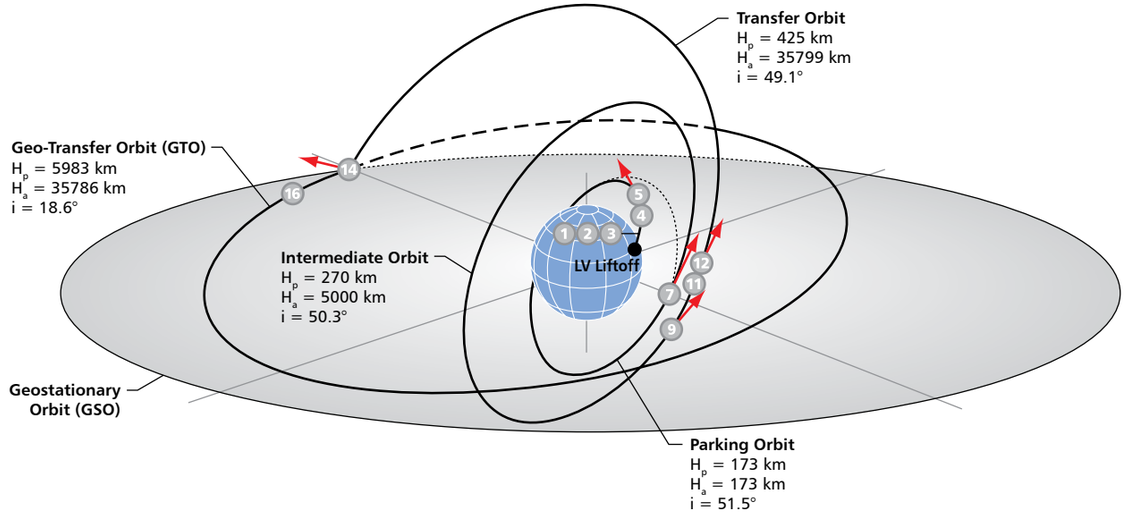
GROUND TRACK





ASCENT PROFILE

PROTON ON PAD 39

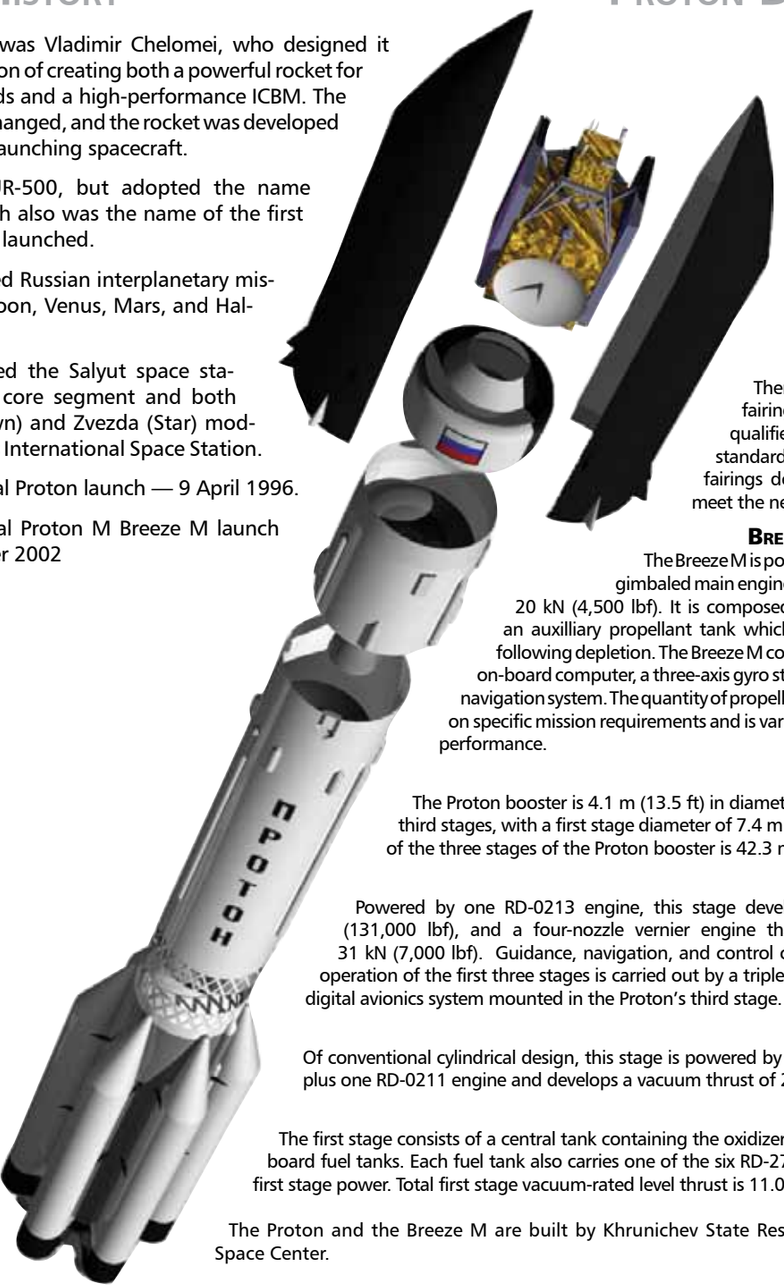


FLIGHT DESIGN

THE **VEHICLE**

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002



Proton Description

Total Height
58.2 m (191 ft)

Gross Lift-off Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

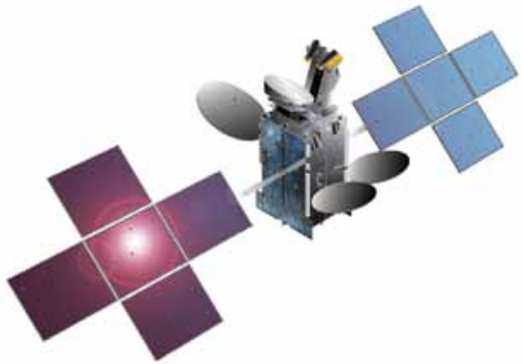
Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE **SATELLITE**



Satellite Operator
Satélites Mexicanos S.A. de C.V.
www.satmex.com

Satellite Manufacturer
Space Systems/Loral
www.ssloral.com

Platform
SS/L 1300

Separated Mass
5474 kg

Satellite Mission Lifetime
15 Years

Satellite Mission
SATMEX 8 is a high-power C- and Ku-band satellite that will replace SATMEX 5 and will provide fixed satellite services in North, Central and South Americas. This new satellite will provide enhanced performance and capacity to the coverage area. SATMEX 8 will improve the current continental and regional services for video contribution, video distribution, broadband, cellular backhaul and distance learning.

Mission Overview

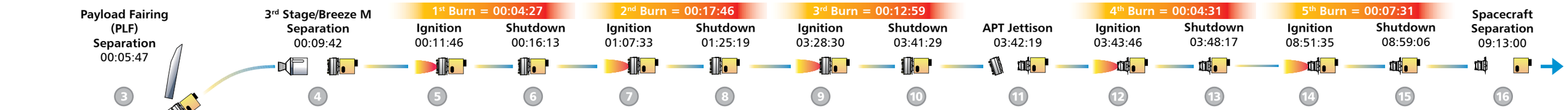
Experience ILS: Achieve Your Mission
QUALITY | PERFORMANCE | EXPERIENCE | DEDICATION

www.ilslaunch.com

SATMEX 8

- **1st** SATMEX Satellite Launched on ILS Proton
- **1st** ILS Proton Launch in 2013
- **78th** ILS Proton Launch Overall
- **25th** Space Systems/Loral Satellite Launched on ILS Proton

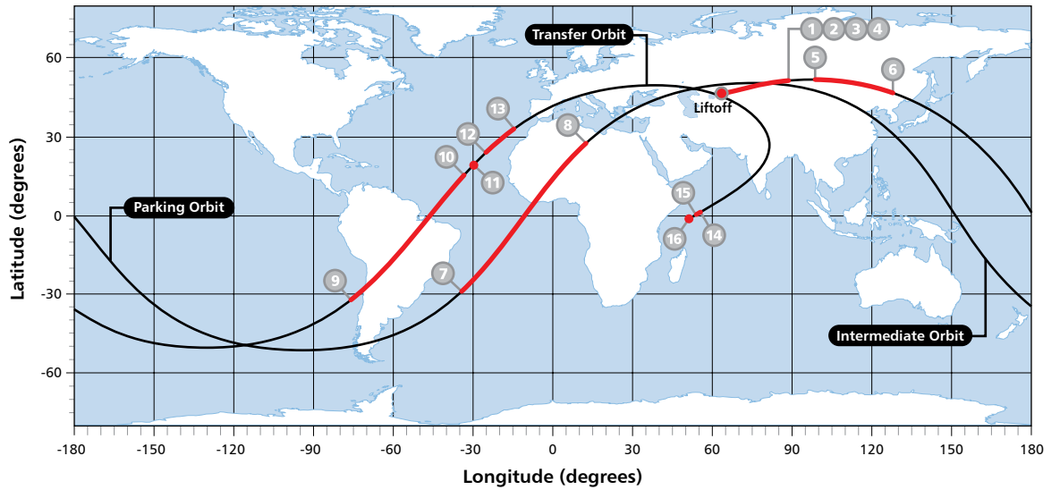
THE **MISSION**

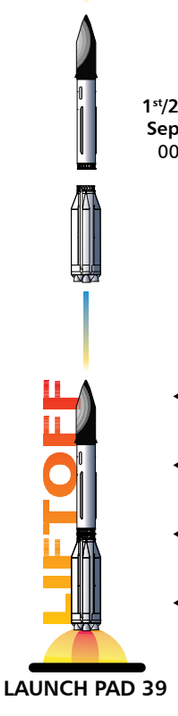


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the Satmex 8 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the Satmex 8 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geostationary transfer orbit. Separation of the Satmex 8 satellite is scheduled to occur approximately 9 hours, 13 minutes after liftoff.

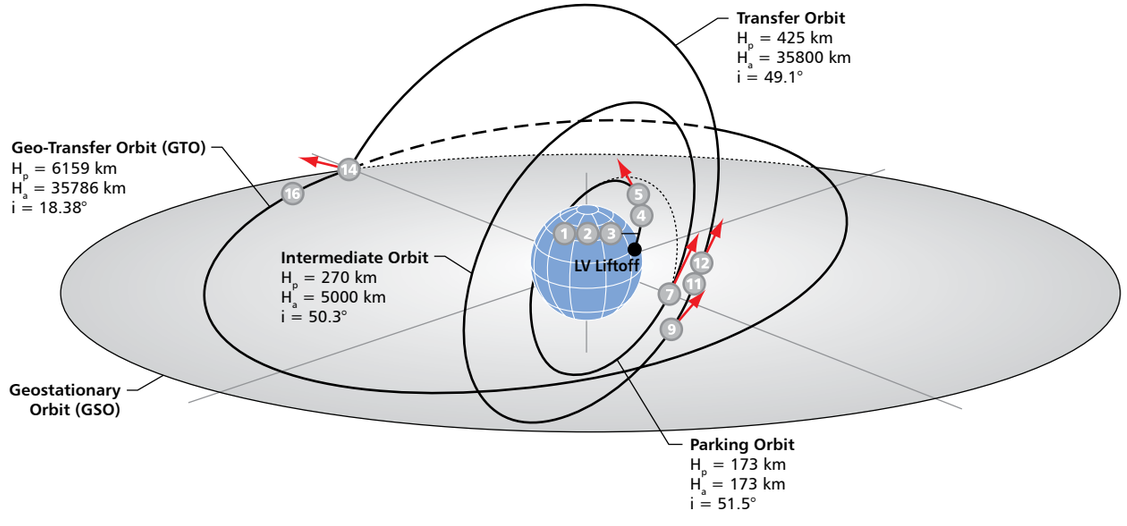
GROUND TRACK





ASCENT PROFILE

PROTON ON PAD 39



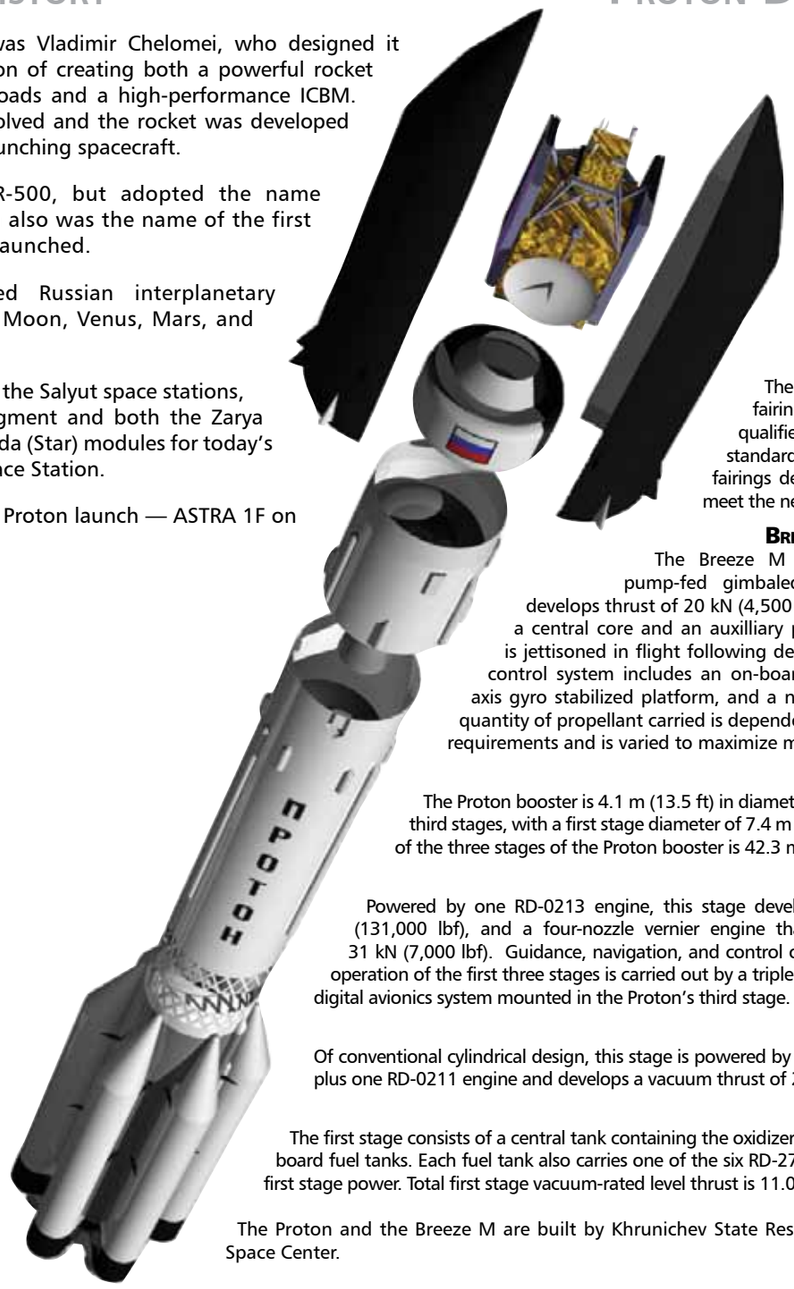
FLIGHT DESIGN

THE VEHICLE

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program evolved and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — ASTRA 1F on 9 April 1996.

Proton Description



Total Height
56.2 m (184 ft)

Gross Liftoff Weight
691,000 kg
(1,523,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE SATELLITE

Satellite Operator
SES WORLD SKIES
www.ses.com

Satellite Manufacturer
Orbital Sciences Corporation
www.orbital.com

Platform
Star 2.4E

Separated Mass
2561 kg

Satellite Design Life
16 Years

Satellite Mission
SES-1 is the 26th satellite in the SES WORLD SKIES fleet, which is part of the 42-spacecraft constellation of parent company SES. The satellite replaces AMC-2 and AMC-4 at 101° West, delivering communications services to customers in the enterprise, government and media sectors from the center of the North American arc. The satellite powers networks encompassing thousands of VSAT terminals, and delivers high-definition video channels that constitute part of SES WORLD SKIES' extensive HD-PRIME television neighborhood. SES-1 is the first of a new generation of SES WORLD SKIES satellites bearing the "SES" name, joining the existing line of AMC satellites over North America and the NSS satellites covering the rest of the world.

ILS

www.ilslaunch.com

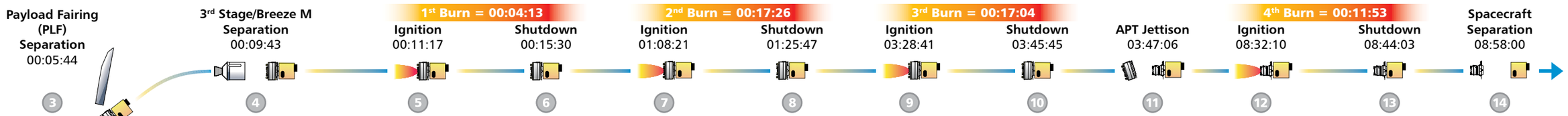
SES-1

Mission Overview

- **3rd** ILS Proton Launch in 2010, **5th** Proton Launch in 2010
- **59th** Proton Launch for ILS
- **17th** SES Satellite Launched on ILS Proton
- **3rd** Orbital Satellite Launched with ILS

KHRUNICHEV STATE RESEARCH AND PRODUCTION SPACE CENTER

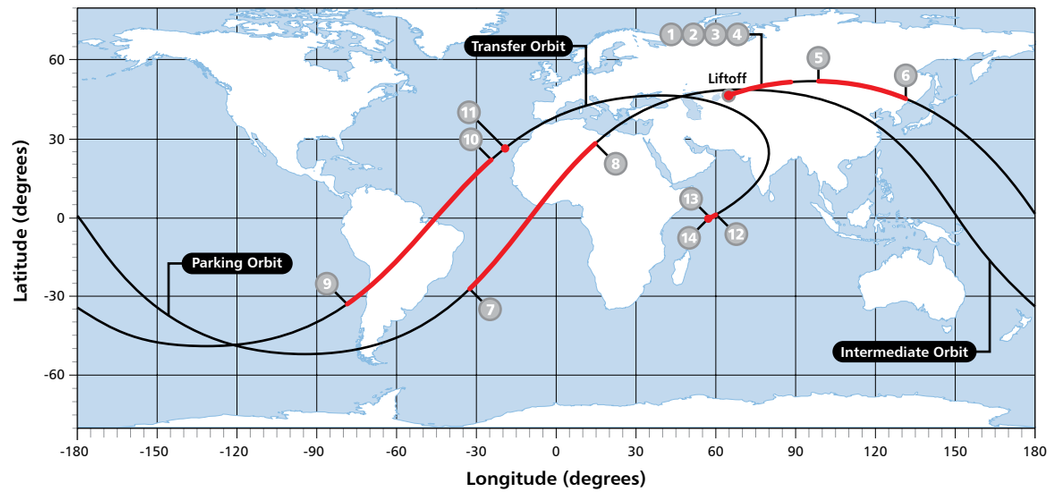
THE **MISSION**

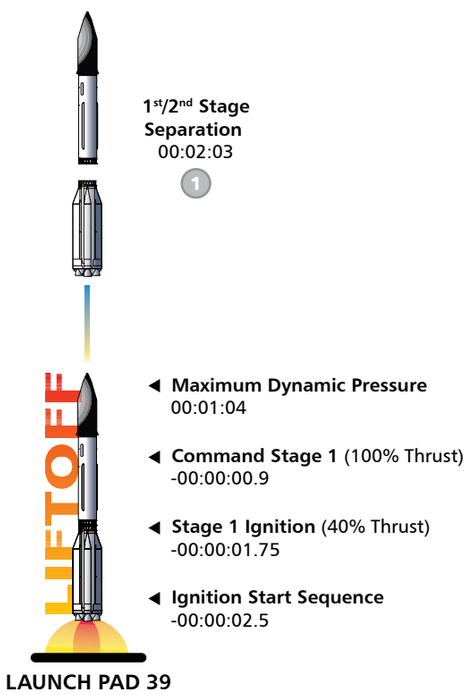


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 4-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the SES-1 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the SES-1 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a near geostationary orbit. Separation of the SES-1 satellite is scheduled to occur approximately 8 hours, 58 minutes after liftoff.

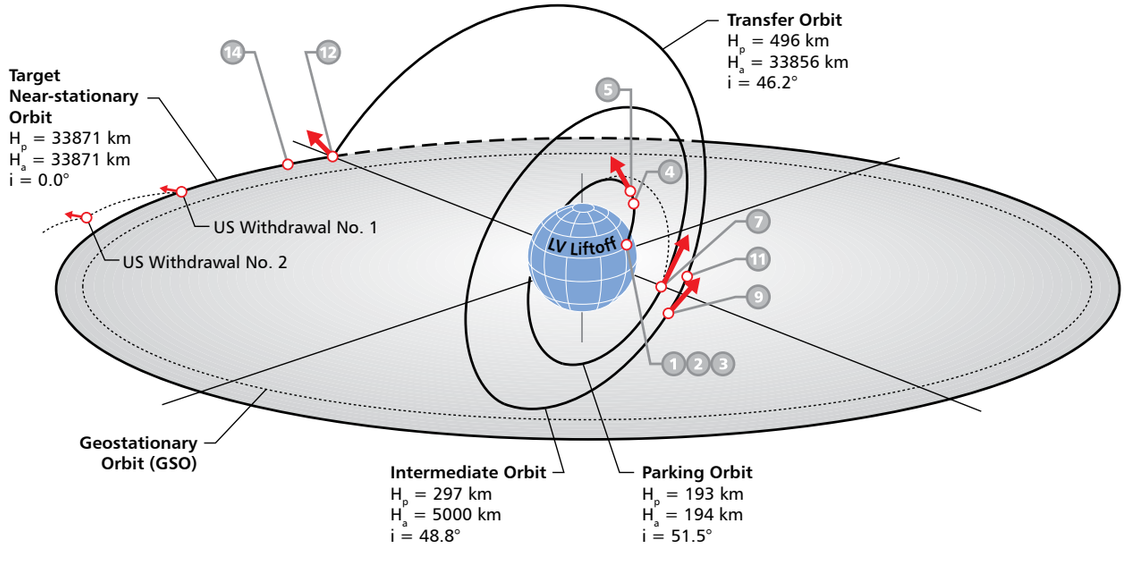
GROUND TRACK





ASCENT PROFILE

PROTON ON PAD 39

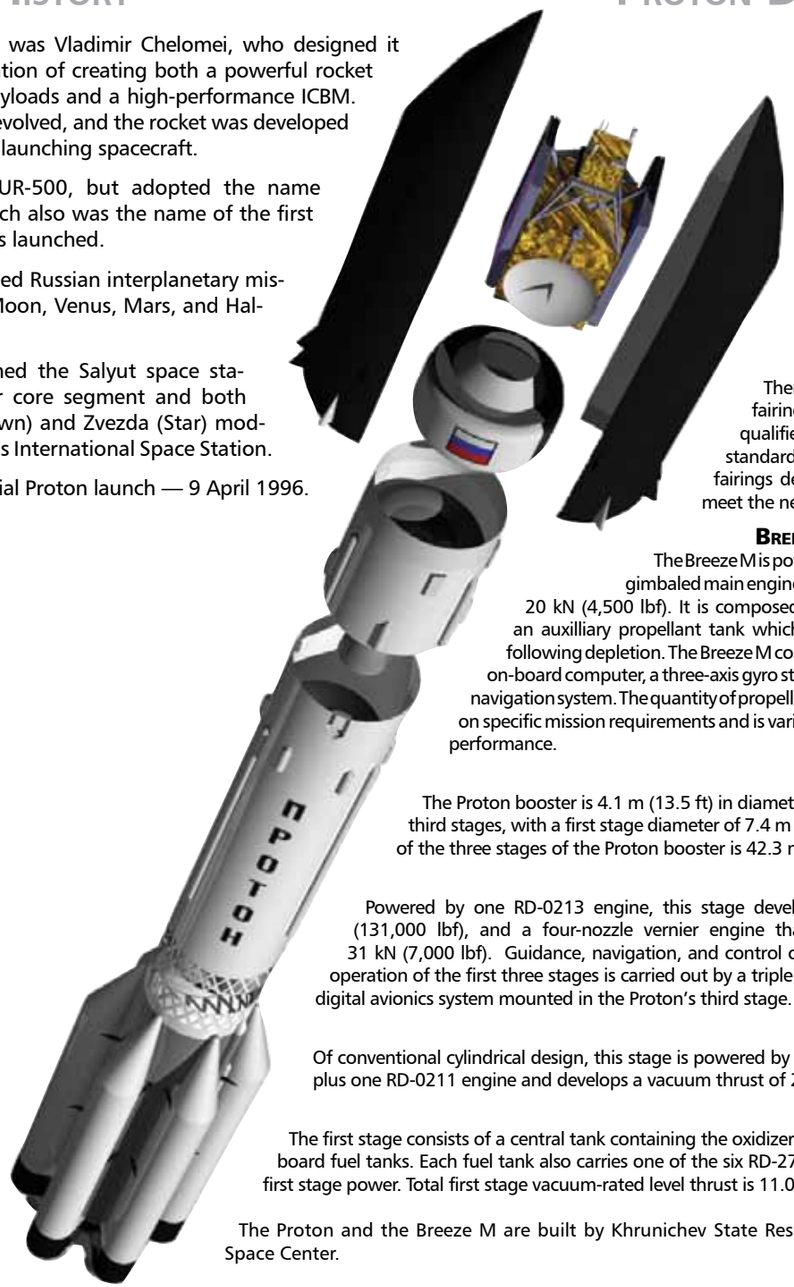


ORBIT INSERTION

THE **VEHICLE**

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program evolved, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.



Proton Description

Total Height
58.2 m (191 ft)

Gross Liftoff Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE **SATELLITE**

Satellite Operator
SES WORLD SKIES
www.ses.com

Satellite Manufacturer
Orbital Sciences Corporation
www.orbital.com

Platform
Star 2.4E

Separated Mass
3112 kg

Satellite Design Life
15 Years

Satellite Mission
SES-3, the 29th satellite in the SES WORLD SKIES fleet, is part of a total fleet of more than 40 satellites of parent company SES. The satellite is expected to replace AMC-1 at 103° West longitude in mid 2012 and provide continuity of service to the enterprise, government and media sectors from the center of the North American arc. SES-3 will be the home of key media companies delivering educational, international and high-definition video channels throughout the U.S. The satellite will also be powering mobile communications, private networks and thousands of VSAT terminals for the enterprise community. SES-3 is the third satellite in a new generation of SES WORLD SKIES satellites bearing the "SES" name, joining the existing line of AMC satellites over North America and the NSS satellites covering the rest of the world.

Mission Overview

ILS

Experience ILS: Achieve Your Mission

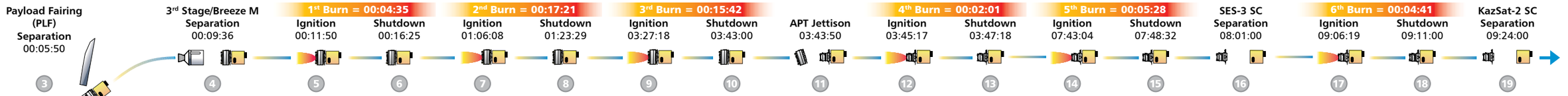
QUALITY | PERFORMANCE | EXPERIENCE | DEDICATION

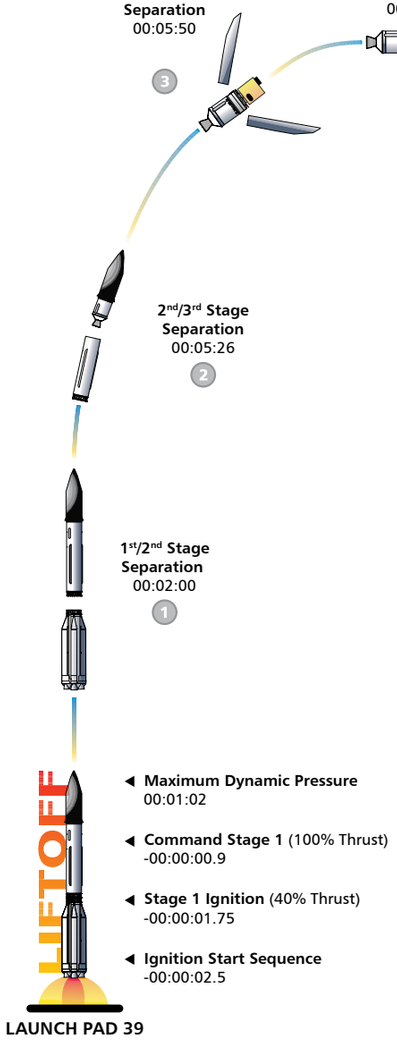
www.ilslaunch.com

SES-3

- **1st** Shared ILS Proton Launch
- **18th** SES Satellite Launched on ILS Proton
- **4th** Orbital Satellite Launched on ILS Proton

THE **MISSION**





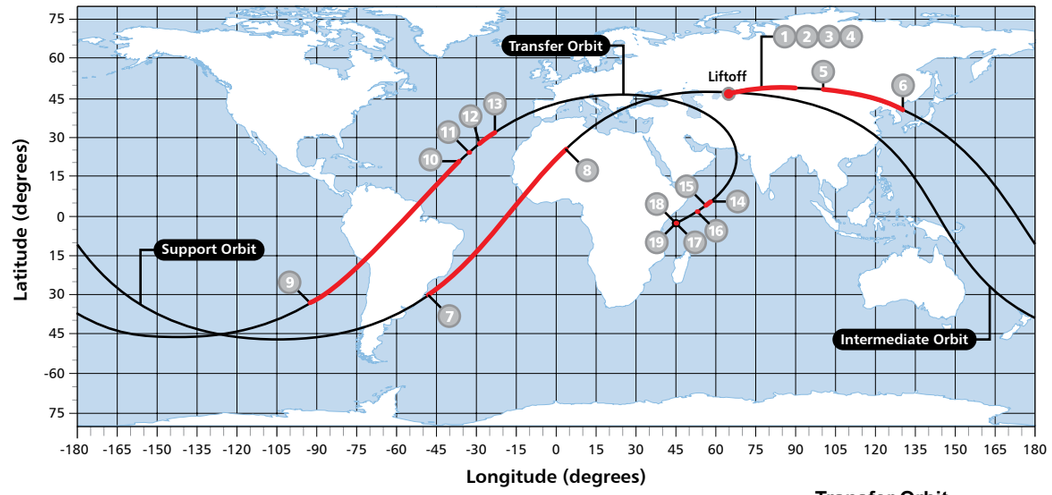
ASCENT PROFILE

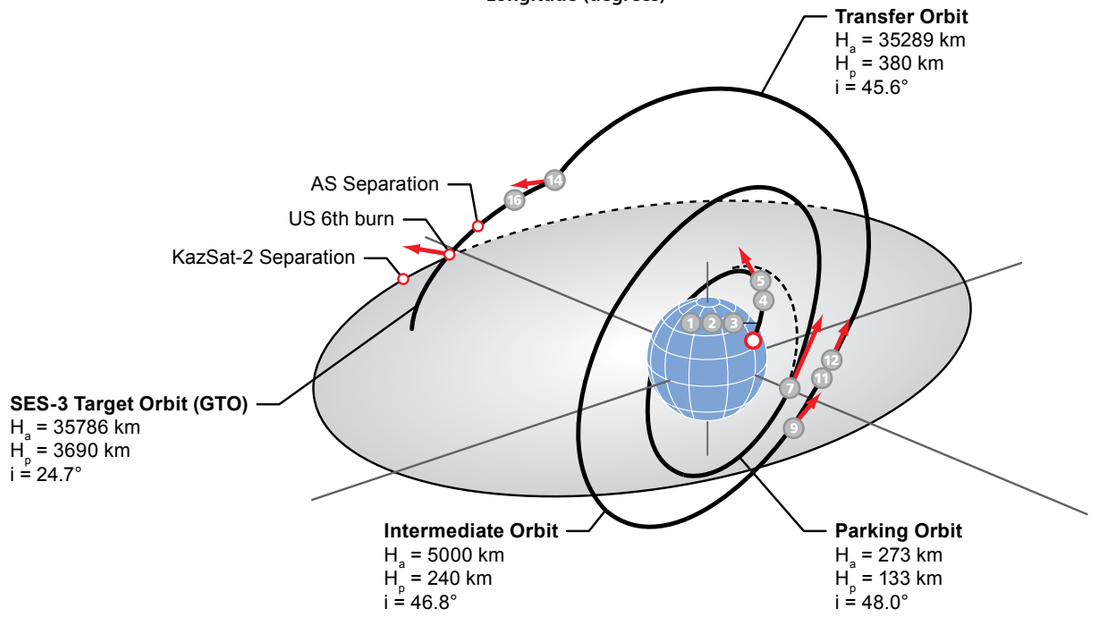
MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 6-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the SES-3 satellite on board. This a shared launch configuration, where the SES-3 satellite is launched while mated to the top of the KazSat-2 satellite. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the SES-3 and KazSat-2 satellites) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to an elliptical parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geosynchronous transfer orbit. Separation of the SES-3 satellite is scheduled to occur approximately 8 hours, 1 minute after liftoff. An hour later, the Breeze M that will place the KazSat-2 satellite directly into geosynchronous orbit. Separation of the KazSat-2 satellite is scheduled to occur approximately 9 hours, 24 minutes after liftoff.

PROTON ON PAD 39

GROUND TRACK



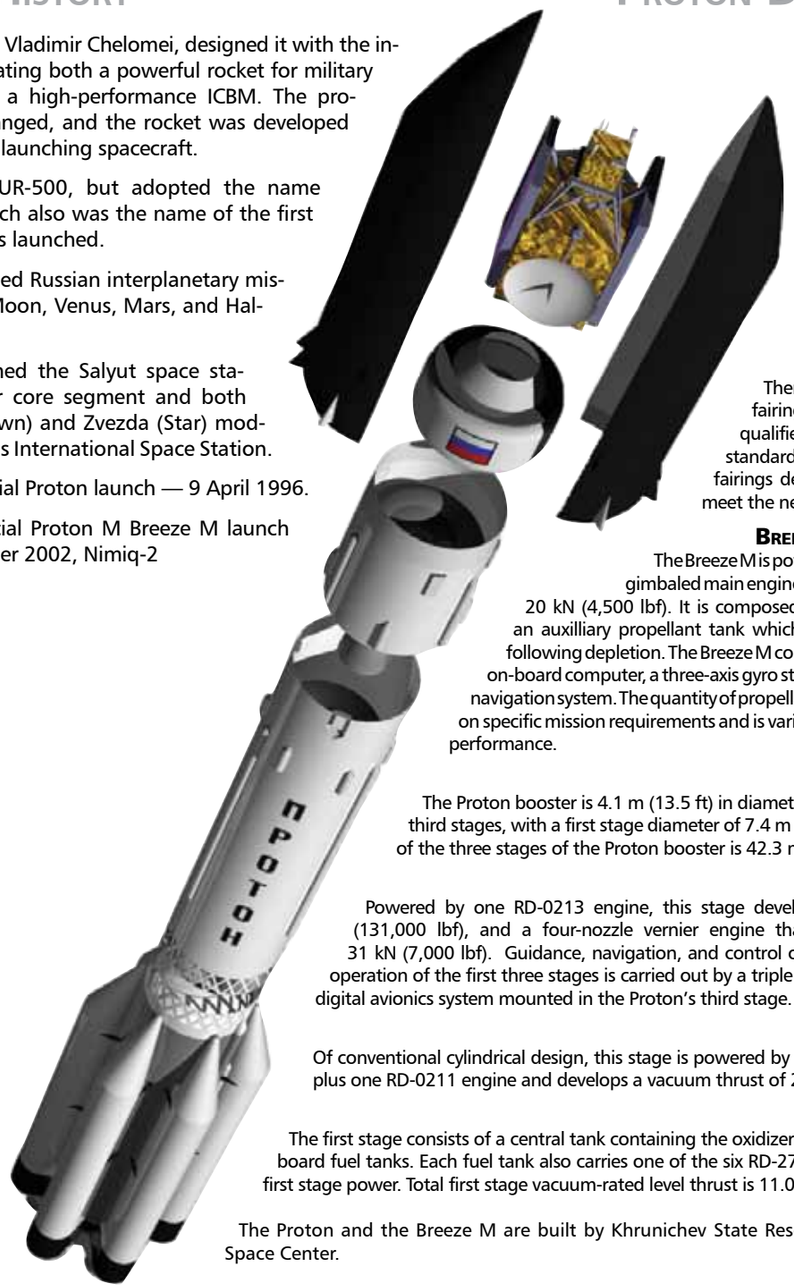


FLIGHT DESIGN

THE **VEHICLE**

Proton History

- Lead designer, Vladimir Chelomei, designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002, Nimiq-2



Proton Description

Total Height
58.2 m (191 ft)

Gross Liftoff Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE **SATELLITE**

Satellite Operator
SES
www.ses.com

Satellite Manufacturer
Space Systems/Loral
www.ssloral.com

Platform
SS/L 1300

Separated Mass
6,180 kg

Satellite Mission Lifetime
15 Years

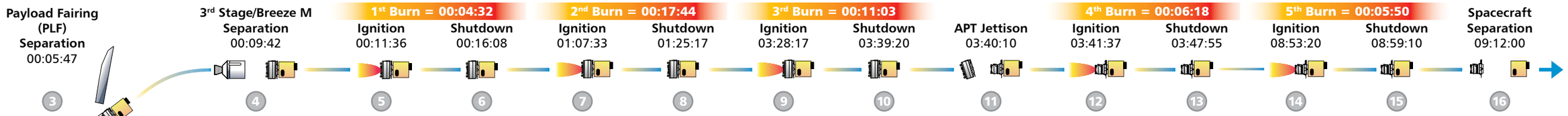
Satellite Mission
Poised to be the largest satellite in the SES fleet, SES-4 at 338° East replacing NSS-7, will enhance what is already the largest neighborhood in the Atlantic. SES-4 will be a hybrid satellite featuring high powered C-band coverage and incremental global capacity which is ideal for video distribution, government and VSAT services. The satellite's Ku-band payload will provide enhanced coverage and capacity across Europe, the Middle East, Africa, Western Africa and Latin America. SES-4 will bring a substantial increase in the total capacity available at 338° East. The state-of-the-art spacecraft has been specifically designed for its orbital location, with C-band beams serving the eastern hemisphere of Europe/Africa, full America's coverage as well as a global beam to support mobile and maritime customers. Four high powered regional Ku-band beams will provide service to Europe, the Middle East, West Africa, North America and South America with extensive cross-strapping between C- and Ku-band transponders providing enhanced connectivity.

Mission Overview

SES-4

- **20th** SES Satellite Launch on ILS Proton
- **21st** Space Systems/Loral Satellite Launched on ILS Proton
- **1st** ILS Proton Launch in 2012
- **70th** ILS Proton Launch Overall

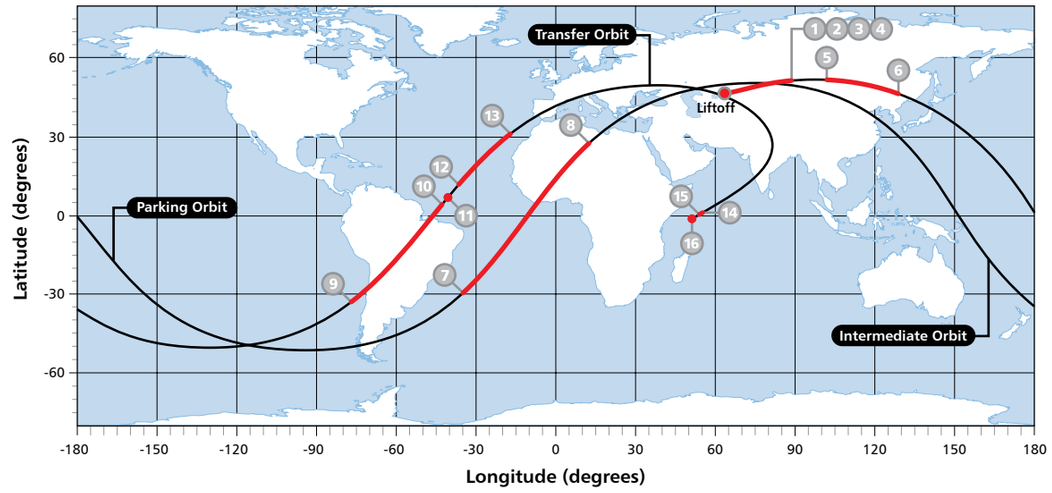
THE **MISSION**

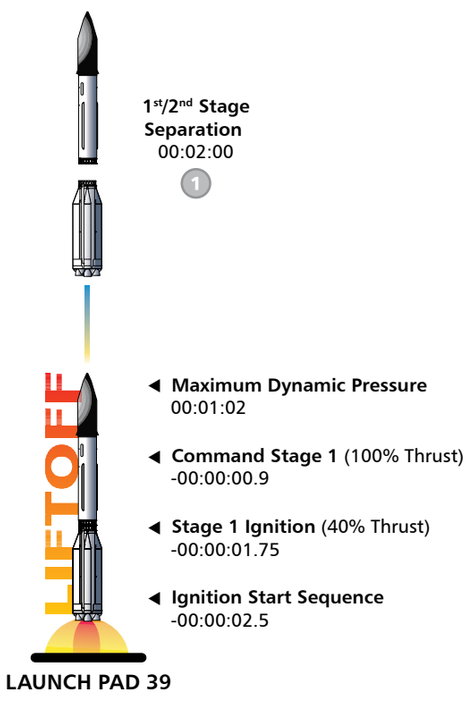


MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the SES-4 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the SES-4 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geosynchronous transfer orbit. Separation of the SES-4 satellite is scheduled to occur approximately 9 hours, 12 minutes after liftoff.

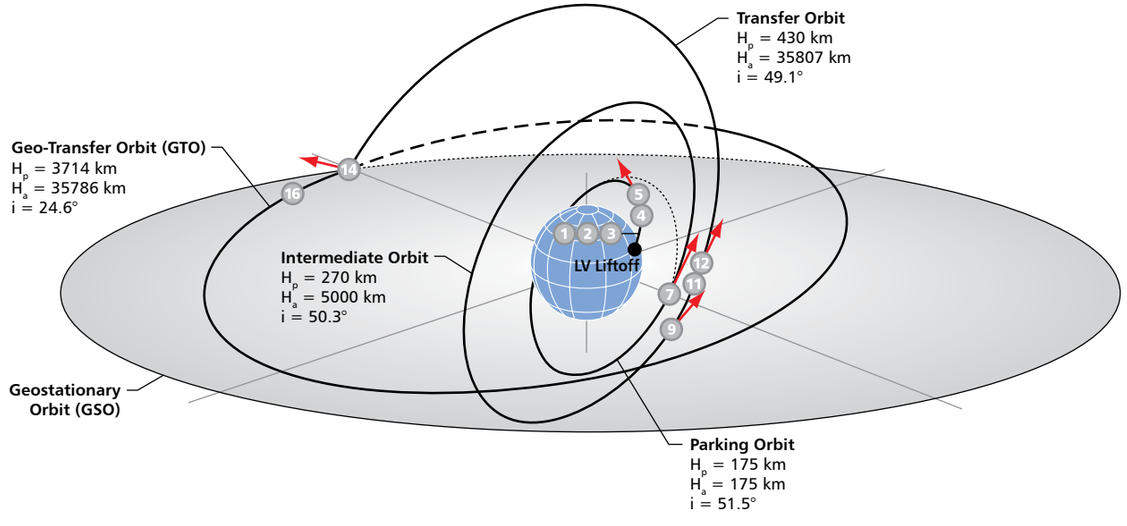
GROUND TRACK





ASCENT PROFILE

PROTON ON PAD 39

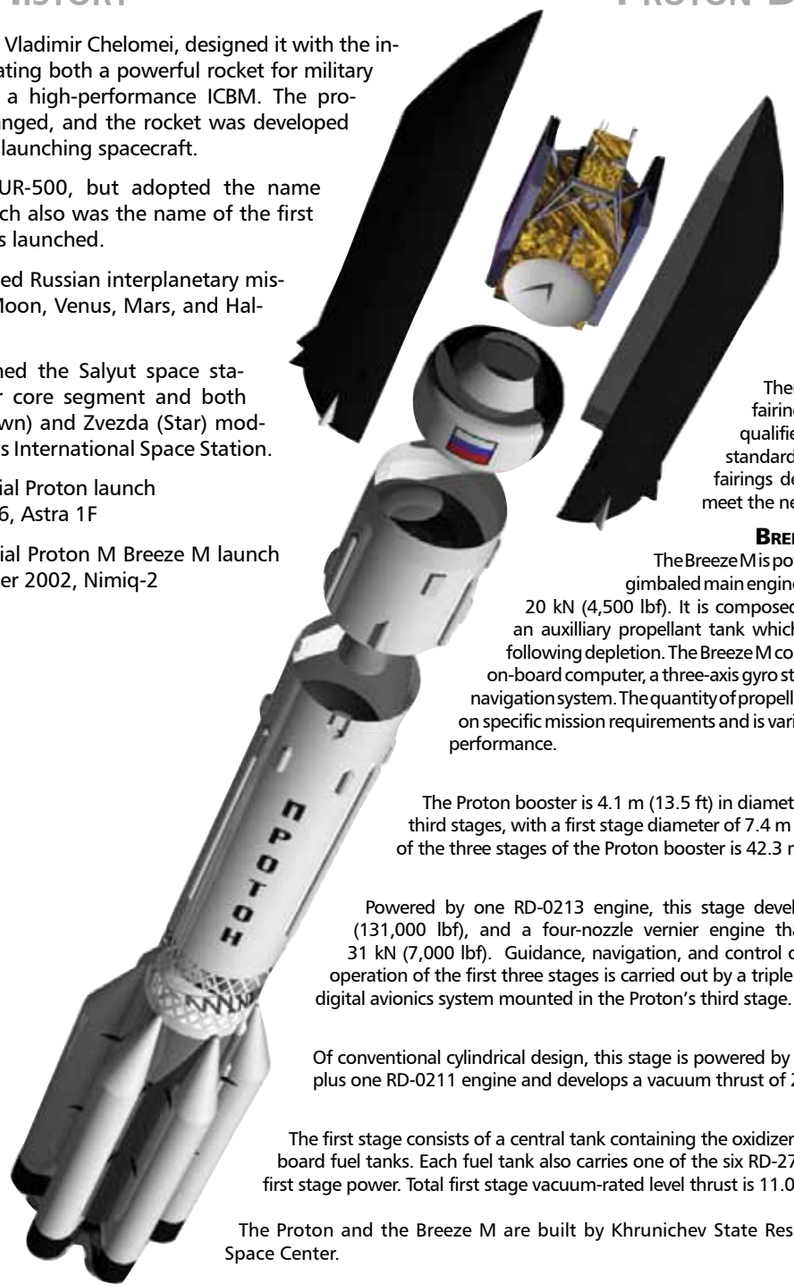


FLIGHT DESIGN

THE **VEHICLE**

Proton History

- Lead designer, Vladimir Chelomei, designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch — 9 April 1996, Astra 1F
- First commercial Proton M Breeze M launch — 30 December 2002, Nimiq-2



Proton Description

Total Height
58.2 m (191 ft)

Gross Liftoff Weight
705,000 kg
(1,554,000 lb)

Propellant
UDMH and NTO

Initial Launch
16 July 1965
Proton-1 Spacecraft

Payload Fairings
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxilliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

Proton Booster
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

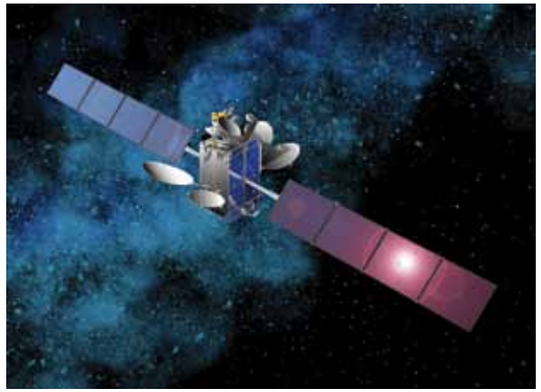
Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage
Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage
The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

THE **SATELLITE**



Satellite Operator
SES
www.ses.com

Satellite Manufacturer
Space Systems/Loral
www.ssloral.com

Platform
SS/L 1300

Separated Mass
6,008 kg

Satellite Mission Lifetime
15 Years

Satellite Mission
SES' high-powered Ku-band beams will bring incremental capacity over Africa, and the Nordic and Baltic countries to support DTH services. Its comprehensive C-band beams cover Africa, the Middle East and Europe to enable services such as GSM backhaul, VSAT applications, maritime communications and video distribution. SES-5 will also carry the first hosted L-band payload for the European Commission's European Geostationary Navigation Overlay Service (EGNOS).

Mission Overview

ILS

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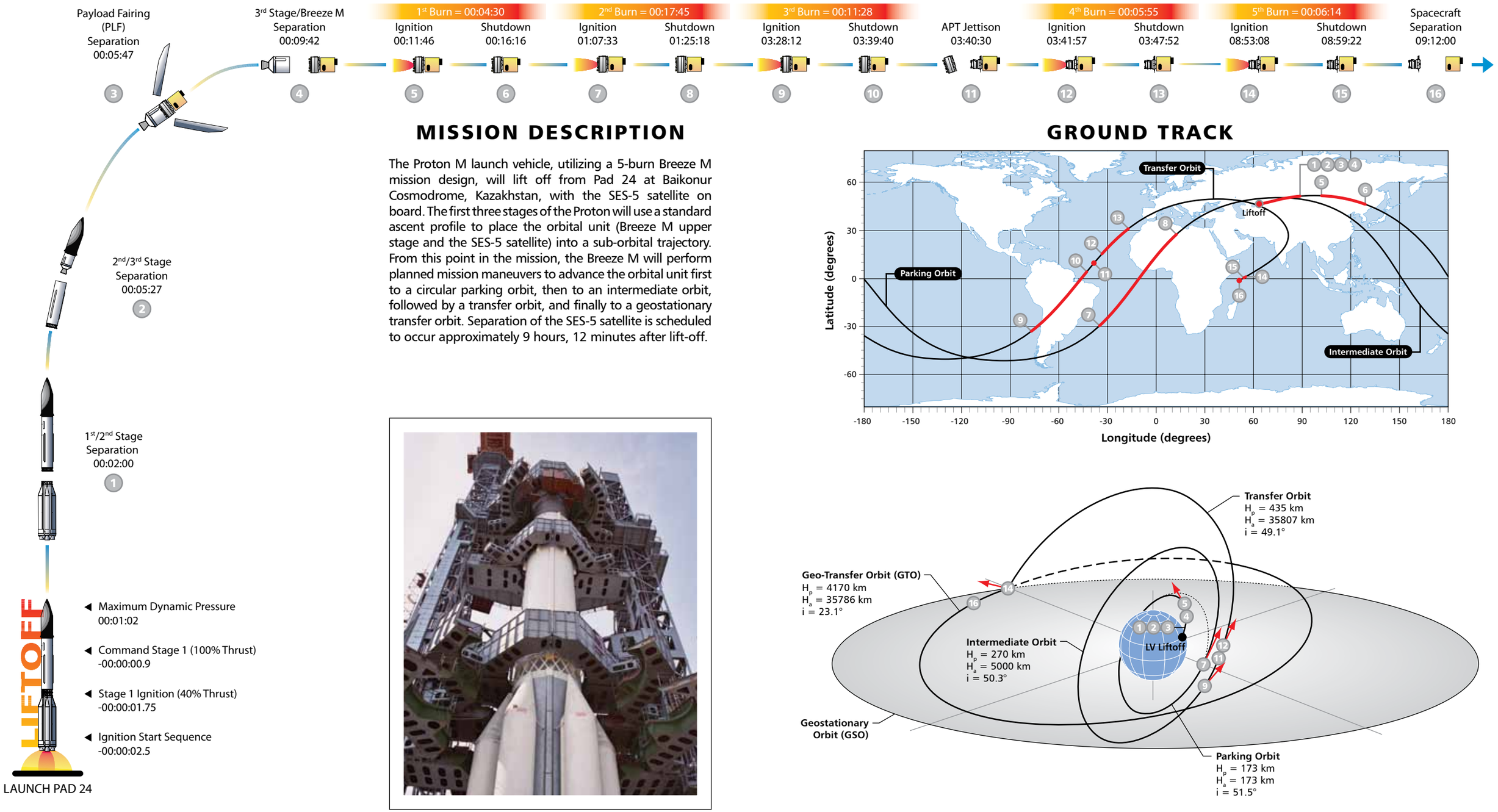
QUALITY | PERFORMANCE | EXPERIENCE | DEDICATION

www.ilslaunch.com

SES-5

- **5th** ILS Proton Launch in 2012
- **74th** ILS Proton Launch Overall
- **21st** SES Satellite Launch on ILS Proton
- **23rd** Space Systems/Loral Satellite Launched on ILS Proton

THE **MISSION**



ASCENT PROFILE

MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 24 at Baikonur Cosmodrome, Kazakhstan, with the SES-5 satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the SES-5 satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geostationary transfer orbit. Separation of the SES-5 satellite is scheduled to occur approximately 9 hours, 12 minutes after lift-off.

PROTON ON PAD 24

GROUND TRACK

FLIGHT DESIGN